MASSACHUSETTS

AGRICULTURAL JOURNAL.

VOL. III.] NOVEMBER, 1813. [No. I.

OF SOILS AND MANURES.

The importance of the subject would be a sufficient apology, should our publications be found to treat frequently of *Manures*. The following extracts from a valuable Treatise of the celebrated Dr. Kirwan, entitled, "Manures most advantageously applicable to the various kinds of soils, &c." will be read with interest by every Farmer. It is rare that a work so learned is so well adapted to the mass of general readers. We commence with the analysis of *Soils*.

OF SOILS.

LAND, considered as the basis of vegetation, is called *soil*.

Soils consist of different combinations of two or more of the four primitive earths, namely, the calcareous (which I sometimes call mild calx) magnesia, argill, and the silicious. For a more accurate description of these I must refer to books of mineralogy; and shall only remark, that by calcareous earths are meant chalk, and all stones that burn to lime. They are easily distinguished by their property of effervescing with acids.

Magnesia is never found alone; its distinguishing character consists in affording a bitter salt, generally called Epsom Salt, when combined with the vitriolic acid.

Argill is that part of clay to which this owes its property of feeling soft and unctuous, and of hardening in fire; it is difficultly soluble in acids, and scarce ever effervesces with them. When combined with the vitriolic acid, it forms alum.

Silicious earth is often found in a stony form, such as flint or quartz; and still more frequently in that of a very fine sand, such as that whereof glass is made. It does not effervesce, nor is it soluble in any of the common acids.

To these we may add Iron, in that imperfect state in which it exists when reduced to rust, and commonly called Calx of Iron.

The soils most frequently met with, and which deserve a distinct consideration; are clay, chalk, sand, and gravel, clayey loam, chalky loam, sandy loam, gravelly loam, ferruginous loam, boggy soil, and heathy soil, or *mountain*, as it is often called.

Clay is of various colours, for we meet with white, grey, brownish red, brownish black, yellow or bluish clays.

It consists of argill and fine sand, usually of the silicious kind, in various proportions, and more or less ferruginous.

Chalk, if not very impure, is of a white colour, moderate consistence, and dusty surface, stains the fingers, adheres slightly to the tongue, does not harden when heated, but, on the contrary, in a strong heat burns to lime, and loses about four-tenths of its weight—It promotes putrefaction.

Sand. By this is meant small loose grains of great hardness, not cohering with water, nor softened by it.

Gravel differs from sand chiefly in size: however, stones of a calcareous nature, when small and rounded, are often comprehended under that denomination.

Loam denotes any soil moderately cohesive; that is, less so than clay, and more so than loose chalk. By the Author of the Body of Agriculture, it is said to be a clay mixed with sand.

Clayey Loam denotes a compound soil, moderately cohesive, in which the argillaceous ingredient predominates. Its coherence is then greater than that of any other loam, but less than that of pure clay. The other ingredient is a *coarse* sand, with or without a small mixture of the calcareous ingredient. It is this which farmers generally call *strong*, *stiff*, *cold*, and *heavy* loam, in proportion as the clay abounds in it.

Chalky Loam. This term indicates a loam formed of clay, coarse sand, and chalk; in which, however, the calcareous ingredient or chalk much predominates. It is less cohesive than clayey loams.

Sandy Loam denotes a loam in which sand predominates: it is less coherent than either the above mentioned. Sand, partly

coarse and partly fine, forms from 80 to 90 per cent. of this compound.

Gravelly Loam differs from the last only in containing a larger mixture of coarse sand, or pebbles. This and the two last are generally called by farmers, *light* or *hungry* soils; particularly when they have but little depth.

Ferruginous Loam or *Till.* This is generally of a dark brown, or reddish colour, and much harder than any of the preceding: it consists of clay and calces of iron, more or less intimately mixed. It may be distinguished not only by its colour, but also by its superior weight.

Boggy Soil, or *Bogs*, consist chiefly of ligneous roots of decayed vegetables mixed with earth, mostly argillaceous, and sand, and a coaly substance derived from decayed vegetables. Of bogs there are two sorts: the black, which contain a larger proportion of clay and of roots more perfectly decayed, with mineral oil. In the red the roots seem less perfectly decayed, and to form the principal part.

Heathy Soil is that which is naturally productive of heath.

OF MANURES.

Manure denotes any substance or operation by which a soil is improved. To improve a soil is to render it capable of producing corn, legumens, and the most useful grasses.

The substances principally used as manures, are chalk, lime, clay, sand, marl, gypsum, or plaster of Paris, ashes, stable dung, mucks, farm-yard dung, pounded bones, sea-weeds, sweepings of ditches, old ditches. Other manures or top-dressings, as they are employed chiefly to promote the growth of vegetables, and not merely with a view of improving the soil, I omit.

The operations used to improve soils, are fallows, draining, paring and burning.

Of chalk, clays, and sand, we have already treated.

Lime is a substance whose external characters and mode of production are well known. It differs from chalk and powdered limestone chiefly by the absence of fixed air, which is expelled from these during their calcination. This air it greedily reabsorbs from the atmosphere, and all other bodies with which it comes in contact, and which can furnish it; but it cannot unite

with the air, unless it is previously moistened. 100 parts quicklime absorb about 28 of water. It is soluble in about 700 parts of this fluid. To regain its full portion of air from the atmosphere, it requires a year or more, if not purposely spread out: it resists putrefaction, but with the assistance of moisture. It resolves organic substances into a mucus.

Marl is of three sorts; calcareous, argillaceous, and silicious, or sandy. All are mixtures of mild ealx (i. e. chalk) with clay, in such a manner as to fall to pieces by exposure to the atmosphere, more or less readily.

Calcareous Marl is that which is most commonly understood by the term *marl*, without addition. It is generally of a yellowish white, or yellowish grey colour; rarely brown or lead coloured. It is seldom found on the surface of land, but commonly a few feet under it, and on the sides of hills, or rivers that flow through calcareous countries, or under turf in bogs. Frequently of a loose texture, sometimes moderately coherent; rarely of a stony hardness, when it is, it is called *stone-marl*. Sometimes of a compact, sometimes of a lamellar texture; often so thin as to be called *paper-marl*. It often abounds with shells, and then is called *shell-marl;* which is looked upon as the best sort. When in powder, it feels dry between the fingers; put in water, it quickly falls to pieces or powder, and does not form a viscid mass. It chips and moulders by exposure to the air and moisture, sooner or later, according to its hardness and the proportion of its ingredients: if heated, it will not form a brick, but rather lime. It effervesces with all acids. It consists of from 33 to 80 per cent. of mild calx, and from 66 to 20 per cent. of clay.

To find its composition, pour a few ounces of weak, but pure spirit of nitre or common salt into a Florence flask; place them in a scale and let them be balanced; then reduce a few ounces of dry marl into powder, and let this powder be carefully and gradually thrown into the flask, until after repeated agitation no effervescence is any longer perceived; let the remainder of the powdered marl be then weighed, by which the quantity projected will be known; let the balance be then restored; the difference of weight between the quantity projected and that requisite to restore the balance will discover the weight of air lost during effervescence; if the loss amounts to 13 per cwt. of the quantity

of marl projected, or from 13 to 32 per cwt. the marl essayed is calcareous marl. This experiment is decisive, when we are assured by the external characters abovementioned, that the substance employed is marl of any kind; otherwise some sorts of the sparry iron-ore may be mistaken for marl. The experiments to discover the argillaceous ingredient (being too difficult for farmers) I omit. The residue left after solution, being well washed, will, when duly heated, generally harden into a brick.

Argillaceous Marl contains from 68 to 80 per cwt. of clay, and consequently from 32 to 20 per cwt. of aerated calx or chalk. Its colour is grey or brown, or reddish brown, or yellowish, or bluish grey. It feels more unctuous than the former, and adheres to the tongue: its hardness generally much greater. In water it falls to pieces more slowly, and often into square pieces: it also more slowly moulders by exposure to the air and moisture, if of a loose consistence: it hardens when heated, and forms an imperfect brick. It effervesces with spirit of nitre or common salt, but frequently refuses to do so with vinegar. When dried and projected into spirit of nitre in a Florence flask, with the attentions abovementioned, it is found to lose from 8 to 10 per cwt. of its weight. The undissolved part, well washed, will, when duly heated, harden into a brick.

Silicious, or *Sandy Marls*, are those whose clayey part contains an excess of sand: for, if treated with acids in the manner abovementioned, the residuum or clayey part will be found to contain above 75 per cwt. of sand; consequently chalk and sand are the predominant ingredients.

The colour of this marl is brownish grey, or lead-coloured: generally friable and flakey, but sometimes forms very hard lumps. It does not readily fall to pieces in water. It chips and moulders by exposure to the air and moisture, but slowly. It effervesces with acids; but the residuum after solution, will not form a brick.

Limestone Gravel. This is a marl mixed with large lumps of limestone. The marl may be either calcareous or argillaceous; but most commonly the former. The sandy part is also commonly calcareous.

Gypsum or *Plaister of Paris* is a compound of calcareous earth and vitriolic acid: it forms a distinct species of the calca-

reous genus of fossils: of which species there are six families. It promotes putrefaction in a high degree.

Ashes. Sifted coal-ashes, those of peat and white-turf ashes, have been found useful; red-turf ashes useless, and generally hurtful. Wood-ashes have also been employed advantageously in many cases; they contain either the four primitive earths, as Mr. Bergman asserts, or calcareous earth chiefly, according to Achard: or calcareous and magnesia, according to D'Arcet. They also contain some proportion of phosphorated selenite, *i. e.* calcareous earth united to the phosphoric acid. Almost all contain also a small and variable proportion of common salt, Glauber's salt, and terrene salts, which, when in a small dose, all accelerate putrefaction; also small bits of charcoal.

Charcoal is a substance well known; it has frequently and successfully been used as a manure. 1st Young's Annals, 150, &c.

Soap-boilers' Waste or Suds forms an excellent manure for some soils; it contains, by Mr. Ruckert's Analysis, 57 per cwt. of mild calx, 11 of magnesia, 6 of argill, and 21 of silex.

Stable Dung. This is used either fresh or putrefied; the first is called *long*, the other *short dung;* it abounds in animal matter, easily runs into putrefaction, and when putrefied serves as a leaven to hasten the decay of other dead vegetable substances; *its fermentation is promoted by frequent agitation and exposure to the air: yet it should be covered, to prevent water from carrying off most of its important ingredients; or, at least, the water that imbibes them should not be lost.*

Farm-yard Dung consists of various vegetables; as straw, weeds, leaves, fern, &c. impregnated with animal matter; it ferments more slowly than the former; should be piled in heaps, and stirred, from time to time. Fern putrefies very slowly; the water that issues from it should be preserved.

Pounded Bones form also manure, much used in the neighbourhood of great towns. They gradually deposit their oily part, which contains a large proportion of animal coal which is extricated by putrefaction, and phosphorated calx. Hence Bone-ash is also useful.

Sea-weed, particularly if mixed with earth, soon putrefies and makes a good manure.

Sweepings of Ditches abound with putred matter from decayed vegetables, and hence form a manure.

Old Ditches, exposing a large surface to vegetation, contain, when destroyed, a quantity of decayed vegetables, which putrefy and make a good manure; but in this and the former case, it may be proper to distinguish of what soil they are composed, for reasons that will hereafter appear.

Fallowing, is the principal operation by which exhausted lands are restored to fertility; its use seems to me to consist in exposing the roots of vegetables to decay, whereby food for a fresh growth is prepared; the atmosphere also deposits fixed air and carbonaceous substance on earth long exposed to it.

Draining is an operation equally necessary and well known, on which no more need be said here.

Paring and Burning reduces the roots of vegetables to coal and ashes; and thus prepares both a stimulant and nutriment for plants, as will be seen hereafter. For the process of burning to make manure, the fire should be slow and smothered as in charring wood.

OF THE FOOD OF PLANTS.

To discover the food of plants, particularly of those which form the object of our present inquiry, we must examine the nature and proportion of the substances in which they grow, and of those which they themselves contain: thus we shall be enabled to see which of the latter are derived from the former.

First, All plants, (except the subaqueous) grow in a mixed earth, moistened with rain and dew, and exposed to the atmosphere. If this earth be chemically examined, it will be found to consist of silicious, calcareous, and argillaceous particles, often also of magnesia, in various proportions, a very considerable quantity of water, and some fixed air. The most fertile, also, contain a small proportion of oil, roots of decayed vegetables, a coaly substance arising from putrefaction, some traces of marine acid, and gypsum.* On the other hand, if vegetables be analyzed, they will be found to contain a large proportion of water and charcoal; also fat and essential oils, resins, gums, and vegetable acids; all which are reducible to water, pure air, inflammable

* Home, 15 Mem. D'Agriculture, Par. 1790. Encycloped. *Vegetation*, p. 277.

air and charcoal: a small proportion of fixed alkali is also found, some neutral salts, most commonly gypsum, tartar vitriolate, common salt, and salt of sylvius. In corn, and particularly wheat, phosphorated selenite is also found.

Hence we see that, on the last analysis, the only substances common to the growing vegetables and the soils in which they grow, are water, coal, different earths, and salts. These, therefore, are the true food of vegetables: to them we should also add fixed air, though, by reason of its decomposition, it may not be distinctly found in them, or at least not distinguishable from that newly formed during *their decomposition.*

I shall now examine the separated functions of each of these ingredients.

Of Water.—The agency of water in the process of vegetation, has never been doubted, though the manner in which it contributes to it, has not, until of late, been distinctly perceived. Doctor Hales has shewn, that in the summer months a sun-flower, weighing three pounds avoirdupois, and regularly watered every day, passed through it, or perspired twenty-two ounces each day; that is, nearly half its weight. He also found that a cabbage-plant, weighing one pound and nine ounces sometimes perspired one pound three ounces; but at a medium about half its weight.* Doctor Woodward found that a sprig of common spearmint, a plant that thrives best in moist soils, weighing only 28,25 grains passed through it 3004 grains in seventy-seven days, between July and October; that is, somewhat more than its own weight each day. He did more; for he found that in that space of time, the plant increased seventeen grains in weight, and yet had no other food but pure rain-water. But he also found, that it increased more in weight when it lived on spring-water, and still more when its food was Thames water.† From whence we may deduce that grasses and corn, during the time of their growth, absord about one half their weight of water each day, if the weather be favourable.

Secondly, That the water they thus pass nourishes them merely as water, without taking any foreign substance into the account; for 3000 grains of rain water, in Doctor Woodward's experiment, afforded an increase of seventeen grains; whereas

* 1 Hales, 9, 10, 15. † 2 Phil. Trans. Abr. 716.

by Margraaf's experiments, 5760 grains of that water contain only one third of a grain of earth.*

Thirdly, It also follows, that water contributes still more to their nourishment, when it conveys to them earthly and saline particles, as spring and Thames waters do.

The manner in which pure water contributes to the nourishment of plants, besides the service it renders them in distributing the nutritive parts throughout their whole structure, and forming itself a constituent part of all of them, may be understood from modern experiments. Doctor Ingenhouz and Mr. Senebier have shewn that the leaves of plants exposed to the sun produce pure air: now water has of late been proved to contain about eighty-seven per cwt. of pure air, the remainder being inflammable air. Water is then decomposed by the assistance of light within the vegetable; its inflammable part is employed in the formation of oils, resins, gums, &c.; its pure air is partly applied to the production of vegetable acids, and partly expelled as an excrement.

Many, indeed, have asserted, that water is the sole food of vegetables; and among the experiments adduced to prove it, that of Van Helmont, quoted by the illustrious Mr. Boyle,† is by far the most specious. He planted a trunk of willow, weighing five pounds in an earthen vessel filled with earth dried in an oven, and then moistened with rain-water. This vessel, it appears, he sunk in the earth, and watered partly with rain-water, and occasionally with distilled. After five years, he found the tree to weigh one hundred and sixty-nine pounds, and the earth in which it was planted, being again dried, to have lost only two ounces of its former weight, though the tree received an increase amounting to one hundred and sixty-four pounds.

Before I proceed to the explication of this experiment, I must remark some circumstances attending it: First, That the weight of the earth contained in the vessel at the commencement and at the end of five years, could not be exactly compared, because the same degrees of desiccation could not be exactly ascertained, and because many of the fibrillæ of the roots of the tree must have remained in the earth after the tree was taken out of the vessel, and these must have prevented the true loss of earth

* 2 Margr. 6, 70. † 2d Shaw's Boyle, 240.

from being perceived. Secondly, That the earthen vessel must have frequently absorbed water impregnated with whatever substance it might contain, from the surrounding earth in which it was inserted; for unglazed earthen vessels easily transmit moisture. (First Hales 5, and Tillet's Mem. Par. 1772, page 298, 304, 8vo.) Thirdly, As it appears that the pot was sunk in the earth, and received rain-water, it is probable that distilled water was seldom used.

These circumstances being considered, it will easily be made to appear that the rain-water, absorbed by the tree, contained as much earth as the tree can be supposed to contain.

First, The willow increased in weight one hundred and sixty-four pounds in five years; that is, at the rate of 2,7 lb nearly per month; and it being an aquatic, it cannot be supposed to pass less than its own weight of water each day during the six vegetating months. In the first month therefore, it absorbed and passed 5✕30=150 pounds, and as each pound of rain-water contains one third grain of earth, fifty grains of earth must have been deposited in the plant; and allowing no more than fifty grains for the deposit of each of the six months, we shall have 50✕6=300 for the deposit of the first year; but at the end of the first year the plant gains an accession of thirty-two pounds, therefore in each of the six summer months of the succeeding year, it passes 37✕30=1110 pounds of water, and receives a deposit of three hundred and seventy grains; and at the end of the second year, the deposit amounts to 2220 grains. At the commencement of the third year, the tree gaining a farther accession of thirty-two pounds must weigh sixty-nine pounds, and pass in each of the summer months 69✕30=270 pounds of water, and receive a deposit of six hundred and ninety grains which multiplied into 6=4140 grains. At the commencement of the fourth year, the tree still gaining thirty-two pounds must weigh one hundred and one pounds; and if it passes 101=30 in each of the summer months, it must gain a deposit in each of 1010 grains of earth, and at the end of the year 6060. At the commencement of the fifth year, it weighs one hundred and thirty-three pounds, and gains at the end of the six months 23940 grains of earth. The quantities of earth deposited each year exceed five pounds avoirdupois, a quantity equal to that which one hundred and sixty-nine pounds of willow can be supposed to

contain; for the commissioners employed to inspect the fabrication of salt-petre in France, having examined the quantities of ashes afforded by trees of various kinds, found that 1000 pounds of *sally*, a tree much resembling the willow, afforded twenty-eight pounds of ashes, and consequently one hundred and sixty-nine pounds should produce 4,7.* I do not give this calculation, however, as rigorously exact. It is certain that if the deposit left at the end of every month were exactly taken, the total would exceed the quantity just mentioned; but that, found even by this rude mode, sufficiently proves that water conveys a portion of earth into vegetables equal to any that the experiments hitherto made can prove to exist in them.

As to the coal, or carbonaceous principle, which this willow must also have contained, it is probable that much of it existed in the earth in which the willow grew. Some is contained in all moulds or vegetable earth; and as we are not told what sort of earth Van Helmont used, we may well suppose it was good vegetable earth, its quantity amounting to 200 lb. This principle may also have been contained in the water, for the purest rain-water contains some oleaginous particles, though in an exceeding small proportion, as Mr. Margraaf has observed;* and all oil contains coal. Some also may have passed from the surrounding vegetable earth through the pores of the earthen vessel. All the other experiments, adduced to prove that water is the sole food of plants, may be explained in the same manner. Grains of wheat have been made to grow on cotton moistened with water; each produced an ear, but that ear contained but one grain.† Here the carbonaceous substance was derived from the grain, and afterwards diffused and transported through the whole plant by the water absorbed; for it must be observed that grain, like an egg, contains much of the nourishment of its future offspring. It is thus that tulips, hyacinths, and other plants, expand and grow in mere water.

The earth contained in rain-water is united partly with the nitrous and marine acids, as Margraaf has shewn, but far the greater part only with fixed air; for the feeble traces of the two former acids could not hold in solution the 100 grains of earth which he found in 300 lb. of rain-water.

* 2d Marg. 15, 90. † 2d Young's Annals, 487.

By far the greatest proportion of vegetable substances consists of water. According to Mr. Young and Ruckert, grass loses about $\frac{3}{5}$ of its weight on being dried into hay.* Dr. Hales found a sun-flower plant, which weighed 48 ounces, to lose 36 ounces by drying in the air during thirty days†, and consequently to have lost 3 fourths of its weight. Even vegetables, to appearance thoroughly dry, contain from 3 fifths to 3 fourths of their weight of water.‡ This water is not all in a liquid state, but, by the loss of much of its specific heat, is in a great measure solidified.

Of Coal, or the Carbonic Substance. To Mr. Hassenfraz we owe the discovery, that coal is an essential ingredient in the food of all vegetables. Though hitherto little attended to, it appears to be one of the primeval principles, as ancient as the present constitution of our globe: for it is found in fixed air, of which it constitutes above $\frac{1}{4}$ part; and fixed air exists in limestones and other substances, which date from the first origin of things.

Coal not only forms the residuum of all vegetable substances that have undergone a slow and smothered combustion, that is, to which the free access of air has been prevented, but also of all putrid vegetable and animal bodies: hence it is found in vegetable and animal manures that have undergone putrefaction, and is the true basis of their ameliorating powers: if the water that passes through a putrefying dunghill be examined, it will be found of a brown colour; and if subjected to evaporation, the principal part of the residuum will be found to consist of coal.§ All soils steeped in water communicate the same colour to it in proportion to their fertility; and this water being evaporated, leaves also a coal, as Mr. Hassenfraz and Fourcroy attest.‖ They also observed, that shavings of wood being left in a moist place for nine or ten months, began to receive the fermentative motion, and being then spread on land, putrefied after some time, and proved an excellent manure.¶ Coal, however, cannot produce its beneficial effects but in as much as it is soluble in water. The means of rendering it soluble are not as yet well

* 2d Young's An. 26. 2d Ruck. 139. † 1st Hales, 8.
‡ Ruckert, 28. Seneb. Encyclop. Vegetation, 52.
§ 14 An. Chy. 56. ‖ Ibid. ¶ Ibid.

ascertained; nevertheless, it is even now used as a manure, and with good effect.* In truth, the fertilizing power of putrid animal and vegetable substances were fully known even in the remotest ages, but most speculatists have hitherto attributed them to the oleaginous, mucilaginous, or saline particles then developed, forgetting that land is fertilized by *paring* and *burning*, though the oleaginous and mucilaginous particles are thereby consumed or reduced to a coal, and that the quantity of mucilage oil or salt in fertile land is so small, that it could not contribute the thousandth part of the weight of any vegetable; whereas coal is supplied not only by the land, but also by the fixed air combined with the earths, and also by that which is constantly set loose by various processes, and soon precipitates by the superiority of its specific gravity, and is then condensed in, or mechanically absorbed by soils, or contained in dew. Lands which contain iron in a semicalcined state, are thereby enabled to decompose fixed air, the iron, by the help of water, gradually attracting the pure air which enters into the composition of fixed air, as Mr. Gadolin has shewn:† a discovery which appears to me among the most important of these later times; but these calces of iron may again be restored to their former state by union with oleaginous substances, as Mr. Beaumè has noticed: and this is one of the benefits resulting from the application of dung before it has fully putrefied.‡ Hence we may understand how soils become effete and exhausted, this effect arising in great measure from the gradual loss of the carbonic principle deposited by vegetable and animal manures, and from them passing into the growing vegetables; and also from the loss of the fixed air contained in the argillaceous part of the soil, which is decomposed by vegetables; and from the calcination of the ferruginous particles contained in the soil. I say in *great measure*, because other causes contribute to the diminution of fertility; which shall presently be mentioned. Hence also we see why lands pastured remain longer fertile than those whose vegetable crop is carried off, as much of the carbonaceous principle is restored by the excrements of the pasturing animals: why some crops exhaust more than others; because corn, and particularly wheat, contains more of the car-

* Young's Annals. † 1st Chym. Ann. 1791, 53.

‡ The affinities of coal and iron to pure air, vary with the temperature.

bonic principle than grasses, and very little of its exuviæ are left behind: why fallows are of some use; as the putrefaction of the roots of weeds and the absorption of fixed air by clays, are thereby promoted: why vegetables thrive most in the vicinity of towns; because the carbonic principle is copiously dispersed by the smoke of the various combustibles consumed in inhabited places: why soot is so powerful a manure: why burning the clods of grassy land contributes so much to its fertility, and then only when the fire is smothered and coal produced; besides many other agricultural phænomena, too tedious to relate: but I must not omit that the phosphoric acid is found in coal; and this enters into the composition of many vegetables.

The quantity of coal in vegetables is various, according to their various species, age, and degrees of perfection: wood and corn contain most, grasses least. Wiegleb found dry beech-wood to contain one fifth of its weight of coal.* Westrumb found *trifolium pratense*, a sort of clover, to contain about one seventh. Hence, after water, it is the most copious ingredient in vegetables.

Of earths. The next most important ingredient to the nourishment of plants is earth; and of the different earths the calcareous seems the most necessary, as it is contained in rain water; and, absolutely speaking, many plants may grow without imbibing any other. Mr. Tillet found corn would grow in pounded glass;† Mr. Succow in pounded fluor spar, or ponderous spar, or gypsum;‡ but Tillet owns it grew very ill; and Hassenfraz, who repeated this experiment, found it scarcely grow at all when the glass or sand were contained in pots that had no hole in the bottom, through which other nutritive matter might be conveyed. It is certain, at least from common experience, that neither grasses nor corn grow well either in mere clay, sand, or chalk; and that in vegetables that grow most vigorously, and in a proper soil, three or four of the simple earths are found. Mr. Bergman, on the other hand, assures us he extracted the four earths, the silicious, argillaceous, calcareous, and muriatic, in different proportions from the different sorts of corn.§ Mr. Ruckert, who

* Uber die alkalis, p. 76.

† Mem. par. 1772, 301, 8vo. ‡ 1st Chym. An. 1784.

§ 5 Bergman, 94, 98. Schœffer Worles, sec. 172.

has analyzed most species of corn and grasses, found also the four above mentioned earths in various proportions in all of them.

Mr. Ruckert is persuaded that earth and water, in proper proportions, form the sole nutriment of plants; but Mr. Giobert has clearly shewn the contrary; for, having mixed pure earth of alum, silex, calcareous earth, and magnesia, in various proportions, and moistened them with water, he found that no grain would grow in them; but when they were moistened with water from a dunghill, corn grew in them prosperously.* Hence the necessity of the carbonic principle is apparent.

The absolute quantity of earth in vegetables is very small. Dr. Watson informs us that 106 avoirdupois pound = 1696 ozs. of oak, being carefully burned, left but 19 ozs. of ashes; and from these we must deduct 1,5 for salt, then the earthy part amounts only to 17-5; that is, little more than one per cwt. The commissioners appointed to inspect the saltpetre manufactory, found nearly the same result; namely, 1,2 per cwt. in beech 0,453, and in fir only 0,003. Hence we need not wonder at trees growing among rocks where scarce any earth is to be seen; but in the stalks of Turkey-wheat, or maize, they found 7 per cwt. of earth, in sun flower plant, 3,7;† so that, upon the whole, weeds and culmiferous plants contain more earth than trees do.

Since plants derive some proportion of earth from the soil on which they grow, we cannot be surprised that the soils should at length be exhausted by crops that are carried off; such as those of corn and hay, particularly the former: even lands pastured must at last be exhausted, as the excrements of animals do not restore the exact quantity that the animals have consumed; and hence the utility of mucks, as the restoration is performed by more animals than have been employed in the consumption. Hence also a succession of different crops injures land less than a succession of crops of the same kind, as different proportions of the different earths are taken up by the different vegetables.

Vegetables not only require food, but also that this food be duly administered to them: a surfeit is as fatal to them as absolute privation. Doctor Hales observed that a young pear-tree, whose roots were set in water, absorbed a smaller quantity of it every day, the sap-vessels being saturated and clogged by it;

* Encyclop. Vegetation, 274. † See 3 Trans. Royal Irish Academy.

and Mr. Miller found that too much water rotted the young fibres of the roots as fast as they pushed out.* Saturated solutions of dung appeared to Mr. Du Hamel equally hurtful.†

Fixed air. That plants do not thrive, but most frequently perish, when surrounded by an atmosphere of fixed air, has long been observed by that great explorer of the most hidden processes of nature, Doctor Priestly; but that fixed air imbibed by the roots is favourable to their growth, seems well established by the experiments of Doctor Percivel of Manchester, and fully confirmed by those of Mr. Ruckert. This last mentioned philosopher planted two beans in pots of equal dimensions filled with garden mould. The one was watered almost daily with distilled, the other with water impregnated with fixed air, in the proportion of half a cubic inch to an ounce of water: both were exposed to all the influences of the atmosphere, except rain. The bean treated with aerated water appeared over ground nine days sooner than that moistened with distilled water, and produced 25 beans; whereas the other pot produced only 15. The same experiment was made on stock-julyflowers and other plants with equal success.‡ The manner in which fixed air acts in promoting vegetation, seems well explained by Mr. Senebier: he first discovered that fresh leaves exposed to the sun in spring water, or water slightly impregnated with fixed air, always produce pure air as long as this impregnation lasts; but as soon as it is exhausted, or if the leaves be placed in water out of which this air has been expelled by boiling, they no longer afford pure air:§ from whence he infers that fixed air is decomposed, its carbonic principle retained by the plant, and its pure air expelled. It appears to me also, by acting as a stimulant, to help the decomposition of water. Mr. Hassenfraz, indeed, denies its decomposition; but his arguments do not appear to me conclusive, for reasons too tedious and technical to mention here.

Of Saline Substances. Saline substances (gypsum and phosphorated calx excepted) seem to serve vegetables (as they do animals) rather as a *condimentum*, or promoter of digestion, than as a *pabulum*, or food. This idea is suggested by the smallness of their quantity, and the offices they are known to perform.

* 1st Hales, 17. † Mem. Par. 1748. ‡ 2d Chy. An. 1788, 399.

§ Sur l'Influence de la Lumiere, and 41 Rosier, 206.

Their quantity is always smaller than that of earth; and this we have already seen to be exceeding small.

OF THE CONSTITUTION OF FERTILE SOILS, AND THE METHOD OF ESTIMATING THEIR FERTILITY.

The first essential requisite to a fruitful soil is, that it contain a sufficient quantity of the three or four simple earths above mentioned, and of the soluble carbonaceous principle. The other requisites are, that the proportion of each, and general texture of the soil, be such as to enable it to admit and retain as much water as is necessary to vegetation, and no more.

Now we have already seen that the retentive powers of moisture are very different in the simple earths: therefore the proportions in which the fertility of a soil requires them to be mixed, must be different in climates and countries that differ considerably in moisture; in the *drier*, they must be such as are most retentive; in the *moister*, such as suffer it to pass or evaporate more easily.

The same remark extends to situation. Lands on a plain should be so constituted as to be less retentive of water than those situated on a declevity; as is very evident.

Mr. Young discovered a remarkable circumstance attendant on fertile soils: he found that equal weights of different soils, being dried and reduced to powder, afforded quantities of air by distillation somewhat corresponding to the ratios of their values. This air was a mixture of fixed and inflammable airs, both proceeding, most probably, from the decomposition of water by the coaly matter in the soil.

OF THE MANURES MOST ADVANTAGEOUSLY APPLICABLE TO THE DIFFERENT SOILS, AND OF THE CAUSES OF THEIR BENEFICIAL EFFTCT IN EACH INSTANCE.

Of Clayey Soils. The best manure for clayey soils is marl; in this all the books of agriculture are unanimous;* and of the different sorts of marl, that which is most calcareous is best; the silicious next best; limestone-gravel best of all; and argillaceous marl least advantageous.†

* 4th Young's Eastern Tour, 404. 1st Body of Agriculture, 104, 108.
† Ibid. 108.

A mixture of marl and dung is still more advantageous,* because the dung supplies the carbonaceous ingredient. But the marl must be used in the same quantity as if dung had not been applied, otherwise the operation must be more frequently repeated.

If marl cannot be had, a mixture of coarse sand and lime perfectly effete or extinguished, or chalk will answer the same purpose, as it will supply the defective ingredient, and open the texture of the clay; so also sand alone, or chalk, or powdered limestone, may answer, though less advantageously. Lime alone appears to me less proper, as it is apt to cake, and does not sufficiently open the soil.

Where these manures cannot be had, coal-ashes, chips of wood, burned clay, brickdust, gravel, or even pebbles, are useful;† for all these improve the texture, and the former supply also the carbonaceous ingredient.

Before I advance farther, to prevent superfluous repetition, I shall lay down a second general maxim; which is, that *dung is a proper ingredient in the appropriated manures of all sorts of soils*, as it supplies the carbonaceous principle.

Of Clayey Loam. This soil is defective either in the calcareous ingredient, or in the sandy, or in both: if in the first, the proper manure is chalk;‡ if in the second, sand; if in both, silicious marl or limestone-gravel, or effete lime and sand.

Chalky Soil. This soil wants both the argillaceous and the stony, sandy, or gravelly ingredients; therefore, the best manure for it is clayey loam, or sandy loam.§

Chalky Loam. The best manure for this soil is clay, or argillaceous marl,‖ if clay cannot be had: because this soil is defective principally in the argillaceous ingredient.

Sandy Soils. The best manure for these is calcareous marl,¶ which exactly corresponds with our theory; for these soils want both argillaceous and the calcareous ingredients; and this marl supplies both: the next best is argillaceous marl; and next to these, clay mixed with lime, or calcareous or clayey loams.

* 4th Young's Eastern Tour, 404.

† 5 Bergman, 107; and Young's Irish Tour, 249, 129, 136.

‡ 1st Young's Eastern Tour 395. § 5 Bergman, 107.

‖ 4th Young's Eastern Tour, 404. ¶ 4th Young's Eastern Tour, 401, 412.

Sandy Loams. These are defective chiefly in the calcareous ingredient, and in some degree also in the argillaceous; their texture too is imperfect, as they abound both in fine and coarse sand; chalk or lime would supply the first defect, but would leave the texture unamended. Hence they are used when better cannot be had;* yet calcareous or argillaceous marls are most proper.† Clay, after land has been chalked, answers, as we are told, remarkably well, because it remedies the texture.‡

Gravelly Loams. These soils are benefitted by the application of marl, whether argillaceous or calcareous,§ for reasons which I suppose are now apparent: if the gravel be calcareous, clay may be employed.|| A mixture of effete lime and clay should answer in all cases.

Till and Vitriolic Soils. These necessarily require the calcareous ingredient to neutralize their peccant acid: hence chalk, limestone-gravel, lime and calcareous marl, are most advantageously applied to them.

Bogs or Boggy Soils. When these are well dried by sufficient drains, the nature of their soil should be explored by analysis, and an appropriate manure applied. In general, they should first be burned, if capable of that operation, then gravelled. If their upper parts contain a sufficiency of the carbonaceous principle, as often happens, they need not be burned. Limestone-gravel will answer best, or lime mixed with coarse sand or gravel, because in general they are of a clayey nature; if more sandy, lime may answer well, or calcareous marl.

Heathy Soils. These should first be burned to destroy the heath, and increase the carbonaceous principle; they should then be analyzed, and the defective principles supplied. Lime is said to destroy heath, and so is lime-stone gravel:¶ this is fittest when the soil is clayey; lime when it is gravelly.** Gypsum also answers remarkably well when the soils are dry.

Of Paring and Burning. This mode of improvement is not particular to any species of soil, though poor soils that have few vegetables growing in them, will certainly profit least by it. Its advantages are,

* 4th Young's Eastern Tour, 398. † Ibid. 402.
‡ 4th Young's Annals, 413.
§ 4th Young's Eastern Tour, 404, 406. || 1st Eastern Tour, 494.
¶ Fourth Young's Eastern Tour, 396. ** Irish Tour, 212.

First, That it converts vegetables and their roots into coal. Hence it is that agricultural writers tell us, though without knowing the reason, that all violence of fire is to be avoided, and that a slow smothering fire is best.*

Secondly, That it destroys the old sickly roots, and thus leaves room for others younger and more vigorous.

Many have imagined, that it diminishes and consumes the soil; but repeated experience has shewn the contrary. I need only mention that of Colonel St. Leger, in Yorkshire, related by Mr. Young in the 1st volume of his Eastern Tour, page 182. It is well known, that clays and loams are rather hardened than consumed by heat. However, unless fresh seeds be committed, the soil will be unproductive for a number of years; the coaly principle may also be exhausted by too many crops.

Of Gypsum, or Plaister of Paris. This manure was discovered by Mr. Mayer, a German clergyman of uncommon merit, in the year 1768; it has since been applied with signal success in Germany, Switzerland, France, and America. If in England it has not been so much approved of, it must be because the calcareous principle prevails there almost universally: clayey lands are most improved by it. The time for spreading it is early in the spring, and then it is to be thinly strewed on the land at the rate of about eight bushels to the acre; more would be hurtful. The *rationale* of its effects may be deduced from its extraordinary sceptic power, for it is found to accelerate putrefaction in a higher degree than any other substance;† and hence it is not ploughed in like other manures, but barely strewed on the surface of the land.

Secondly, From its being itself no inconsiderable part of the food of many plants, particularly of clover, pulse, and corn, but the land on which it is strewed must be dry, such as would naturally suit clover, &c. otherwise it would be useless.

* First Body of Agriculture, 210, 211. † Historie de la Putrefaction, 36.

ON THE AMERICAN HEDGE THORN.

BY THE HON. JOSIAH QUINCY.

[To John Lowell, Esq. Corresponding Secretary to the Massachusetts Society for promoting Agriculture.]

Quincy, 25th June, 1813.

SIR,

LIVE hedges are objects of so much importance, in those parts of this State, where stone cannot easily be obtained; and knowing that a mistaken opinion prevails concerning the expense of this species of fence, I think it will be useful to communicate the result of an experiment made with an express reference to this point.

In March 1808, I imported 10,000 seedling thorns from the nursery of Thomas Main, near Georgetown, in the district of Columbia, of that species, which he calls the "American Hedge Thorn." These were planted in a hedge course, which, in its whole length, was two hundred and fifty-five rods; so far as was necessary, to fill that extent in one line, each plant being five inches apart. The residue were planted in a nursery for the purpose of filling vacancies, which might occur by death or accident.

The hedge course was made in sord land, ploughed of the width of four feet, and manured and prepared, precisely as if for Indian corn; except only that after ploughing, the centre, for two feet wide, was turned over with the spade. Without other preparation, the hedge was planted in April, 1808, on a level, without either bank or ditch.

As I intended this as an experiment, to test the utmost cost of a hedge destined, not for ornament, but for farm use, I directed the tenant of my farm, (Alpheus Cary of this town,) a very faithful and intelligent farmer, to make a separate charge for all the labour bestowed upon it in his account with me, and I paid, without any question, every such charge at the price he affixed; being determined that no particular economy should render the

apparent, less than the real expense. I consider the experiment now as completed, so far, at least, as is necessary for a satisfactory ascertainment of the cost of this species of fence. For the expense of the hedge, this year, has been nothing except the annual trimming. It is, upon an average, nearly five feet high; and a sufficient security against cattle, for almost the whole extent; and is every day strengthening, without any application of attention or labour.

The following is a statement of the expense:

255 rods, or 4207½ feet is 8415 plants:—say 8500				
	at $5 per 1000 -	-	is	$42 50
	Reserved in the nursery -	1500		7 50
		10,000 plants		$50
	Package and freight - - - -			3 75
	Cost of the thorns at and from Georgetown -			$53 75
Labour.	1808, April. Equal to nine days, (oxen and manure included,) breaking up and preparing hedge-course -			$14
do	Setting-out hedge	13 days		12 92
do	May, hoeing	4 do		4
do	June, hoeing and sundries	9½ do		11 63
do	July do	7 do		7
do	August do	1 do		1
do	November do	5 do		5
	Cost of labour, &c. first year -			$55 55
do	1809, April. Hoeing and filling vacancies - -	3 days		$3
do	May, June, July and August, hoeing 19½ days - - - -			19 50
do	November. Treading snow, against mice, one day - - -			1
	Cost of labour the second year -			$23 50
do	1810, February. Cropping hedge, one day - - - -			$1

Labour.	April and August. Hoeing and filling vacancies, 10½ days - - -	10 50
	Cost of labour the third year -	$11 50
do	1811, February. Trimming hedge, one day - - - - -	$1
do	April and August. Hoeing, 7 days -	7
do	Sundries - - - - -	1 13
do	November. Trimming hedge, 1½ days	1 50
	Cost of labour the fourth year -	$10 63
do	1812, April. Hoeing 7 days - - -	$7
do	August do 4 do -	4
	Cost of labour the fifth year -	$11
do	1813, February. Trimming the hedge, two days - - -	$2
	Whole cost of labour, &c.	$114 18
Whole expense of making 255 rods of hedge fence		$167 93

There is no longer any labour necessary, and only general attentions, of a nature not worth an estimate are requisite.

From the result it appears, that two hundred and fifty-five rods of hedge fence, has cost *less than sixty-six cents a rod*; notwithstanding no particular attention was paid to economy in executing the work, and the whole was paid for at the cash value of labour. I have no doubt that where the labour is performed by the farmer himself, and those facilities adopted which experience and the usual attention of practical farmers would suggest, that a complete thorn hedge might be formed, in six or seven years, sufficient against every ordinary danger, for an expense *far less than fifty cents a rod.* Practical farmers, in this neighbourhood, are of the same opinion. The prejudice which was very strong in this vicinity, against the success of the experiment, is in a great measure removed. Several farmers have declared themselves satisfied. One or two have determined to commence a course of hedging as soon as plants can be procur-

ed, and have actually taken measures for this purpose. I mention this fact, because the opinions of intelligent practical farmers are justly of more weight with practical farmers, than are the opinions of men whose habits of life do not lead them to a direct participation in the labours of agriculture.

The course best to be adopted, having reference to the economy of labour, is thought to be the following:

Plough the hedge course *six feet wide*. Plant the whole course one year to potatoes. This pays for the labour as much as other land thus planted. Set the thorns *eight* inches apart. This is near enough in a country like this, where hogs are not permitted to run at large, and makes a considerable saving in the labour as well as in the cost of the plants. Keep both sides of the hedge planted to potatoes, during the whole six years in which the hedge is coming to perfection. The potatoes will nearly pay the cost of the labour. The manure for the potatoes benefits the hedge; and while hoeing the potatoes, keeping the hedge clear of weeds is easy.

To keep the hedge clear of weeds, and to fill up the vacancies regularly, in the spring of every year, with plants of the same age with those of the original hedge, are the two essential objects of attention after the hedge-course is prepared and the plants are set. Younger plants may answer, but whoever would make a hedge, in the most speedy and perfect manner, ought to procure at the time of obtaining the plants for the original hedge, a sufficient extra number to supply all deficiencies likely to occur, through the whole time the hedge is forming; to be kept in a nursery thriving, if possible, a little better than those in the hedge-course. Experience has satisfied me, that *two* for every *ten* planted in the hedge-course, is a number more than adequate for this object.

In the statement of expense, I have made no allowance for *protecting fences*. Where these are necessary, their expense must be added. In my experiment, by excluding cattle, the necessity for them was obviated. Whatever these may cost, the economy of this species of fence, when its durability is taken into view, (to say nothing of its ornamental nature,) must be sufficiently apparent.

Very respectfully,

I am your humble servant,

JOSIAH QUINCY.

CULTURE OF LONDONDERRY WHEAT,

NEAR BOSTON.

BY MR. DUDLEY HARDY.

[To Gorham Parsons, Esquire.]

DEAR SIR, *Brighton, September* 2, 1813.

By your desire I give a statement, but a very awkward one, as I am not much in the habit of writing. The wheat which I raised this year is as follows: I sowed twenty-eight quarts of wheat on three quarters and an half quarter of an acre of land, as nearly as I could ascertain. As to the land on which I raised my wheat, it was on three kinds of soil. The first was high and moist; the second much drier; the third was sandy and very dry, and very thin on the two last pieces. The wheat on the last was not so good and large, but the kernel nearly equal for goodness. I put on one buck load of manure on the weakest part of the land—This land was planted with indian corn the last year. I ploughed my land in the fall, and in the month of March following I began to plough it over again, before the frost was all out of the ground, two or three times, and then harrowed it with an iron tooth harrow; then I prepared my grain by steeping it in lye made of ashes for twenty-four hours; then on the seventh day of April I sowed my wheat, and harrowed it in with the same harrow. After this I bruised the ground smooth with a brush harrow. The twenty-eight quarts of wheat as above, produced eighteen bushels. I have weighed a number of bushels of said wheat, and it gave me sixty pounds per bushel. I have had one bushel ground and bolted, which gave me forty-six pounds and an half of flour. I purchased the wheat of a Mr. Webster of Bradford. As to the mode of raising this grain, I learnt it of Capt. Ellery and an old gentleman from Londonderry in New-Hampshire, and a gentleman from the upper part of this State, all in the habit of raising wheat. I believe the chief difficulty lies in not sowing it in the month of March. I should have sowed mine much sooner than I did, but the frost prevented.

From your most obedient and humble Servant,

DUDLEY HARDY.

ON THE FIORIN GRASS.

BY JOHN WINTHROP, ESQ.

[To the Hon. John Adams, Esq.]

SIR,

WITH your permission, I beg leave to communicate to the very useful and highly respectable Society over whom you preside, some facts and observations relative to a grass lately brought under cultivation in Ireland, and with great success by the Rev. Dr. Richardson of Clonfide. Having noticed, about a year since, several Essays printed in the Edinburgh, British, and other Reviews, highly extolling the properties of the Fiorin Grass, and stating the *prodigious* quantity of its produce, I was induced to address a letter to the Rev. Dr. Richardson, requesting information on the subject. Through the politeness of Mr. English, our consul at Dublin, my letter was immediately forwarded, and Doctor Richardson has done me the honour of answering it, and also sent me a small bundle of the Fiorin strings, which were cut on the 23d of March, and which I put in the ground on the 10th of May.

The Fiorin is an indigenous grass in Ireland. The term is Irish and signifies a plentiful grass; it has also been lately discovered growing on some moss grounds in Scotland. The grass of which the famous "Orchestran meadow" in Wiltshire, England, consists, is principally of this description, and without any analysis of its peculiar properties, has been long considered as the most productive of any ground of equal extent in England.

(1) A late publication enables me to mention the amount of produce of that meadow, which consists only of two acres and an half, and the tithe of which has been compounded with the clergyman of the parish for £9 sterling per annum; this makes (a fair estimate) the produce of the meadow equal to £90, or £36 sterling the English acre, which very far exceeds the produce of any other crop known in England. From the above statement of the various situations in which this grass has been found, it will be at once perceived, that Doct. Richardson claims no merit

for its original discovery, but has the most unqualified claims to our approbation and gratitude for bringing it into cultivation, and for the high reputation it has acquired under his direction and patronage.

In a climate like ours, subject to such long and extreme winters, it becomes an object of primary importance to procure such food for our cattle, as is not only nourishing at the time we first house it, but has the power of retaining its saccharine properties for the greatest length of time. The Fiorin appears to possess this property in an eminent degree, and from various documents in my possession, it appears to have been preferred by cattle, after it had been cut *six months*, to new mown clover; and Doct. Richardson observes, that it possesses the peculiar quality of imparting to milk the same sweetness as green succulent food; and of course butter made from this hay is not subject to that bitter and rancid taste from which, in this state particularly, we suffer so much. In confirmation of the above, I copy the certificates of Lord Viscount Northland, and the Rev. William Jones Armstrong, men of the first respectability:(2) "We carried some dry Fiorin hay," said they, "from the field to the stable, and first offered Lord Northland's horses some common hay which they ate freely, they were then tried with the Fiorin hay, which they seized greedily, and always after rejected the common hay when offered to them, looking about for the Fiorin."

Mr. Harish, a celebrated agriculturist, who has written an Essay on this subject, mentions the decided predilection of every animal to this food. (3) "He says, "In the end of May last, I brought in a small sheaf from the field, which had stood uncut through the whole season, and appeared white and withered. This lay in the room of Mr. Millar of Dalswinton for some days, which increased its dead appearance; Mr. Millar then went to his stables, and caused the coachman to present a part of this sheaf, along with a parcel of fine, sweet clover hay, to every horse; who not only ate Fiorin with great relish, and sought with apparent eagerness for more when it was done, but *refused* the clover altogether."

(4) Mr. Alexander Young asserts a similar fact as experimented by himself, and adds further, "that he tried it with sheep while lambing, and they ate it greedily."

(5) Mr. Robert Ainslie, who has written largely on this subject, and who, next to Doct. Richardson, has cultivated the Fiorin with the greatest success, gives it his decided approbation, as being vastly superior, in its *nutricious* as well as *productive* qualities, to all other grasses known in Europe. I presume sufficient authorities have been quoted from the written and printed declarations of *practical* farmers, both in England and Ireland, to prove the superiority of this species of food over all others, as evidenced by the preference given to it by horses, horned cattle, and sheep, and even after it had been exposed to the alternate vicissitudes "of heat and cold, moisture and drought, for a whole season."

It will now be desirable to enquire on what soils it has been cultivated with the greatest success, and what produce it has given to the acre. In answer to the first enquiry, it has been already shown, that the Fiorin is a natural grass on marshy lands and mosses, and in this description of ground it is recommended chiefly to cultivate it. (6) Doct. Richardson states, in a letter to Sir James Stuart, that he cut his peat in summer, and grew the Fiorin in winter, both within the space of less than *one* year, and on the same piece of ground. The same gentleman, in his letter to me, after requesting information respecting the climate and soil of our part of America, observes: "Now a luxuriant grass for hay, which sustains drought, and is no more injured by the frost and snow (meaning in Ireland) than the paving stones, must be a treasure to America; and my proofs of its uncommon value are increasing daily, and my last crop far exceeds any of the preceding." This letter is dated the 23d March, 1812.

(7) Mr. Millar of Dalswinton near Dumfries, a large landholder, and who has cultivated the fiorin successfully, though at first opposed to it, states in his letter to the Agricultural Society of Ireland, "That this grass will grow upon every soil, and may be laid down at any time of the year." He prefers laying down in the months of September, October and November. Mr. Millar also fully confirms the statement of other gentlemen, relative to the strong vegetating principle which this grass possesses. The *soil*, however, on which it grows most luxuriantly, and for the reclaiming of which it is most wanted, is our meadow and marshy grounds, annually overflowed, and from which we cut that miserable kind of hay known by the name of *swail*; pos-

sessing the least nutriment of all our grasses, and generally combined with coarse sedge, rendering it the poorest sustenance which is used for winter feeding.

To shew of what vast importance the Fiorin would become for reclaiming such lands, I will with your permission state a few facts relating to some moss and peat land reclaimed in Ireland and Scotland.

The first is from Dr. Richardson. (8) A portion of ground, says he, (he does not exactly say meadow, but from what follows the inference is strong) laid down with Fiorin late in August, 1806, and twice mowed in 1807, and not *manured*, produced six tons the English acre; and a portion laid down November 15th, 1806, once mowed in 1807, and *tolerably manured*, produced in 1808, *seven tons, four hundred, one quarter and eight pounds* the English acre.

Mr. D. Millar of Dalswinton, whom I have before mentioned, makes the following statement to the "Irish Agricultural Society," and published by them, viz. That he had laid down eighteen acres on different kinds of soil, and so great had been his success, that he intended to lay down in the course of the year two hundred acres more, and that the whole two hundred acres he had been in the habit of letting to tenants at a yearly rent of one shilling an acre; but in consequence of the following experiment made on a peat bog near his house, he had been induced to take the land into his own cultivation. (9) A peat bog containing thirteen acres, from which peat had been dug many years, and had been let at thirteen shillings per acre, he brought into Fiorin with the spade, it being too wet to work with horses. Mr. Millar represents the process as tedious and expensive, insomuch that it actually cost him £330 sterling to lay it down in Fiorin; but so great was its produce, that he expressly declares, on a lease for nineteen years, he would not rent it under £200 sterling a year; and further, that if he kept it, and took the labors of the tenants on himself, he was confident of making £300 a year from it.

Sufficient evidence has, I presume, been exhibited in the statement above quoted, to warrant a belief, that by a judicious and early attention to the cultivation of the Fiorin, a vast surface of useless meadow may be made infinitely more valuable than our best and highly manured mowing grounds, and that not only

for *one*, *two*, or *three* years, but that a lasting benefit will be ensured. (10) For from Dr. Richardson's letter, it appears that his crop has been continually improving since 1806, and that too, with a very limited use of manure. Another great advantage experienced in Ireland, has arisen from the use of green food for cattle during the whole winter. In order to ascertain this fact, Dr. Richardson advertised that he would mow his Fiorin on the 1st and 15th of every month from October to February. He accordingly did so, and strangers (11) (some of the highest distinction) attended at different times, and examined the hay previously cut, were satisfied of its excellent quality, and notwithstanding the severity of the winter, found it in the best condition.

(12) Sir John Sinclair caused a small plat of it to be cultivated near the new town of Edinburgh, cut it early in the winter, and allowed it to remain uncovered, merely putting it into cocks. It did not however rot as other hay would have done in a similar situation, but remained perfectly fresh, and Mr. Ainslie states that he knew the hay offered to horses after having been thus exposed, and they ate of it with the utmost relish.

Before concluding this essay, I will beg permission to illustrate the uncommon nutricious properties of this grass in feeding *sheep*, an animal, which at the present moment, has become very interesting to Americans. The above mentioned Mr. Millar fed seven sheep constantly with Fiorin, with no other addition than about a pound of potatoes a day to each sheep, reckoning that seven-eighths of their nourishment had depended on the Fiorin: he has killed them from time to time, and found them not only fat, but the mutton of an excellent flavour and taste. (13)

Perhaps it might be well to observe, that Dr. Richardson has most kindly offered to furnish such directions as will enable us to cultivate the Fiorin successfully, notwithstanding the great extremes of heat and cold, to which our climate is subject.

The Doctor has requested me to send him a particular account of the monthly average temperature of our atmosphere, and also of the soils on which we should probably cultivate his grass, as a preliminary step toward his promised publication.

If, Sir, you will do me the honor to communicate these facts and observations to the society, and they should meet their approbation, I will, with great pleasure furnish any information I

now, or may hereafter, possess on its particular mode of cultivation.

I have the honor to be, Sir,
Your's most respectfully,
JOHN WINTHROP.

Dorchester, May 23d, 1812.

AUTHORITIES QUOTED.

(1) The first number of the "British Review" is quoted by Mr. Robert Ainslie, in his memoir to the Agricultural Society of Ireland.
(2) Printed in the publication of the Cork Institution, and published under the sanction of the Agricultural Society of Ireland.
(3) Mentioned in the Munster Magazine for January, 1812.
(4) Writer to the Signet.
(5) Mr. Ainslie's Memoir to the Agricultural Society of Ireland, continued from page 245 of December publications.
(6) See Dr Richardson's letter as published by the Cork Institution.
(7) Published in the Dumfries Journal.
(8) See letter quoted in No. 6.
(9) See letter quoted in note 7, published in Dumfries Journal.
(10) Dr. Richardson's letter to me, of 23d March, 1812.
(11) Marquis of Headfort.
(12) See Robert Ainslie's Memoir, Note 5.
(13) See letter referred to in Note No. 7.

SUGAR FROM THE BUTTERNUT TREE.

BY MR. MOSES P. GRAY.

[To Gorham Parsons, Esquire.]

Epsom, May 15th, 1813.

DEAR SIR,

I SEND you the so long promised sample of sugar; we tapped four oil nut trees of from eight to ten inches diameter at the but, which produced in one day nine quarts of sap, that made one and a quarter pounds of sugar. The trees were at a distance from home, and belonged to Mr. Jonathan Pearson, who assisted me in the process; having no rock maple trees any where within my reach, I was prevented from making an

experiment which I much wished, to see what would be produced from the like number of trees of equal size. The allowance here made is three gallons of maple sap to make one pound of sugar, whether that is perfectly correct I do not know, but I believe so.

I am yours, sincerely yours, &c.

MOSES P. GRAY.

It appearing from the above experiment, that the butternut tree will give as much sugar from its sap as maple, the Trustees are induced to recommend a critical trial on the white walnut. If the sap will run, it will probably yield a greater quantity of saccharine juice than any tree in the country. It is a well known fact that as the warm weather comes on in the Spring, the ends of the trees that have been cut the previous winter, will discharge a considerable quantity of rich juice resembling honey.

ON THE TALL MEADOW OAT GRASS.

BY JUSTIN ELY, ESQ.

[To Dr. Aaron Dexter. M. D.]

West Springfield, May 24th, 1813.

A NEW kind of imported grass seed has lately been received here from New York, called the Tall Meadow Oats, which is said to be preferable to any other grass in the United States. It is described by Dr. Henry Mulenburg of Lancaster, in Pennsylvania, as follows:

"This grass is of all others the earliest, latest, and best grass for green fodder and hay; it blossoms about the middle of May with red Clover, and the seed ripens a month after. It grows best in a Clover soil, and rises to a height of from five to seven feet—it ought to be cut for hay in blossom, about the end of May. The seed may be sown in the fall or spring, with or without grain, and must be brushed in or lightly harrowed. If mixed with Clover, it will make good upland meadow. Horned cattle prefer this grass to all others, but some horses do not relish it green. It must be pastured or cut at least three times in a sea-

son. If suffered to grow old, it will become straw like: when intended for hay it must be salted."*

A few years since I procured a bushel of the seed, but it almost wholly failed. I have lately procured from Thornburn's seed store in New-York some good seed, which I have planted, and it has come up well—our horses are very fond of it green. It ripens so early, the seed will shell out and be lost, if not carefully attended to. The seed sown in May or June, may produce seed the next fall; if not, it will be prepared to seed next June. It is said it will do well for ten years or more without ploughing it up.

I take the liberty to send you herewith a quart of the seed, and request you to distribute it, in small quantities, among the members of the Society, if any should wish it. It is commonly sown in rows in gardens the first year; half a gill or a gill will be sufficient to begin with. It is said to be spreading fast in the State of Pennsylvania, and the neighbouring States; it will be forwarder there than in Massachusetts. It was imported from Germany, and will undoubtedly flourish in any part of the United States. If it answers the description, it will be a valuable acquisition to the country—but perhaps you are already supplied.

I am, with respect and esteem, your humble Servant,

JUSTIN ELY.

ON THE CULTURE OF TREES.

[Extract.]

In vain do we plant trees of any kind, if cattle are admitted among them; even old trees are injured by their rubbing against them, but young ones are ruined. Every planter ought to raise his own trees, that the removal may be easily effected without the roots becoming dry, and that the tree may be continued in nearly the same kind of soil and atmosphere in which it originated. Trees should never be taken from nurseries in large towns to be cultivated in the open country, as the difference of warmth in the air will much affect their growth. Too much care cannot be taken in having the holes dug large, that the young shoots

* Willick's Domestic Encyclopedia, Amer. Edit. Vol. II, part 2, page 194.

may not be injured, but pass easily through the loose mould. Let such trees as are tall be cut down close to the ground, to prevent their being shook by the wind, and to promote their growth. It may seem strange to advise the cutting down a tall well grown plant, yet it is necessary; for the roots are always hurt and shortened by the removal; it is impossible for those that remain, to nourish the same body; this is the reason we so often find our trees dead at top and hide-bound.—Should my directions be followed, which are from thirty years experience, such vigorous shoots will spring up as will in ten years become much larger trees than if they had stood uncut for forty years, and the bark and every appearance of the tree will be like one from the seed, and much trouble will be saved in staking, to prevent their ruin from the wind. Almost every kind of forest tree will do best by cutting down as soon as planted. The food of every plant seems wisely to be scattered over the earth, but particularly of trees. Many trees of different kinds will grow on an acre of ground, when the same number of one sort would be starved. Every attentive gardener knows, that a Peach tree will not do well where an old Peach tree stood, unless it be directly from the old roots, but a Pear or a Cherry will do well in the same spot. The same observations may be made with all other trees. If several shoots appear from the stump of your cut-down tree, all should be taken away but the strongest.

Great attention should be paid with fruit-bearing trees; those that bear bad fruit should not be suffered to grow with those that bear good fruit. It is well known to gardeners, that the blossoms of the Cucumber will spoil the flavour of Melons that grow near them. The same thing takes place with trees that bear fruit.

To bring an orchard as early as possible into profit, plant common wild trees, or what are commonly called Crab Apples, four or five years old.

They should be cut down as soon as planted, and on their young shoots graft or inoculate such fruit as is desired; from this practice more fruit will be obtained in ten years, than in the usual method in twenty years.

The wild tree if grafted on its own stock will come much earlier to bearing fruit, and it will be much improved in size and flavour.

ON A SPECIES OF URTICA,

AS A SUBSTITUTE FOR FLAX AND HEMP.

BY CHARLES WHITLOW.

[To the Corresponding Secretary.]

SIR, *New-York, October 26th*, 1812.

I HAVE discovered a new herbaceous plant, which promises to be superior, as a staple article, to Hemp or Flax: you will see a particular description of it in the Baltimore Medical and Philosophical Lycæum, Vol. I, No. 4. I have sold one hundred roots and one thousand seeds to the Agricultural Society of South Carolina, with the privilege of raising and manufacturing the product of fifty acres yearly, during the term of my patent, for the sum of three hundred dollars—I now give your Society the same offer. Should it be inclined to agree with my proposal, you had better send on immediately; as I expect all the seeds and roots that I now have, will be disposed of in four weeks from this. You will see a description of the plant, with all the experiments made on it by the Mayor and Corporation of New York. It is a perennial plant—the roots may be divided to ten or twenty every year. It will produce five hundred fold from seed. Dr. Foster will give you any information you may want.

CHARLES WHITLOW.

The above communication was committed by the Board of Trustees, to John Lowell, Esq. and Mr. Professor Peck. The subjoined Letters from the latter gentleman, comprise the report of the Committee.

[To John Lowell, Esq. Chairman, &c.]

MY DEAR SIR, *Cambridge, 23d December*, 1812.

I wrote to Dr. Hosack, but as yet have no answer. Professor Mc Kean has furnished me with a news-paper containing the report of the committee of the Corporation of New-York, and

the opinion of Mr. Baldwin of Vermont. These only tend to prove that the fibrous portion of the Nettle in question may be wrought with as much facility as Flax or Hemp. There is no information as to the mode or expense of cultivation. It would be gratifying to see a comparative statement of the expense of cultivating, say an acre of Flax, Hemp and Nettle. If the latter has any superiority over the two former, it is only in its having a perennial root; but as it increases by the root, the tubers must be separated, and this part of its culture may demand as much time and labour as will make it as expensive as either of the former which require no such care.

That the Nettle may be used as Flax is no new discovery. A German writer on economical botany after mentioning the three species Urtica Diöica, Urins and Pilulifera, which are native in that quarter of Europe, observes that the stalks of these are very nearly as fibrous as Flax and Hemp,and after being rotted, broken and hackled, may be used in the same way, but does not say they are better.

A species of Nettle is used in Scotland for making a coarse kind of linen, and the Urtica Cannabina, a Siberian species, is used in France, and perhaps in other parts of Europe. Hemp is of the same natural order with the Nettle, so is the Hop, and the Broussonetia a paper mulberry, from the inner bark of which are fabricated the paper garments and exquisite cordage of the savages of Otaheite and other islands of the Pacific ocean.

The fibre of the Hop is said to be as good as the Nettle, and longer than the Hemp. This is manufactured in some of the northern districts of Sweden.

All this is but little to our purpose; yet it is not entirely unconnected with it, as it states that experiments have been made with a variety of filaceous plants, and none of them have superseded those commonly in use. Whitlow's Urtica may be better than any of them, but of this we have no satisfactory evidence; and I would wish rather to leave it with yourself and the Board of Trustees to decide, whether it may not be better to wait to know the result of experiments which will probably be made the next year, before the purchase of the patent is determined on, than to advise to such a step at present.

I am, my dear Sir, with affection and respect,

Your obedient Servant,

W. D. PECK.

Cambridge, 25th February, 1813.

MY DEAR SIR,

In a note which I addressed to you before the meeting of the Trustees of the Agricultural Society, in December, I observed that the application of Nettles and other plants of the same order to the purposes for which Hemp and Flax are used, was not new in Europe and Asia. I have been informed since, that when the subject of the Urtica Whitlowi was before the Legislature of New-York, some of the members stated to the Committee, that "the plant had long been known, in the neighbourhood where Mr. Whitlow found it; that it had been frequently used for making thread; but that it had been lately abandoned as wanting strength." It appears hence that Mr. Whitlow was not the first to discover, or to apply it to this use.

It was also stated, "that the process of rotting the plant, really rotted the thread." I should judge, from the specimen enclosed in his letter to you, that this process must he managed with great nicety.

Dr. Hosack writes me that he has not, himself, examined it; but from the information he had received from Dr. Eddy, he believes it merits the character (I understand the *good character*) given of it, and that the testimony of the workmen in thread in New-York is certainly in favour of it.

Dr. Hosack obligingly enclosed me a botanical account of the plant by Dr. Eddy, who observes, "that its natural soil is low, wet meadow ground, near rivers and creeks in Orange County, New-York, and Sussex County, New-Jersey, but that it will grow well in a rich upland loam. It will yield from the hatchel for common use, at least sixty-five per cent. It has been spun into six hank yarn, valued at eleven dollars per pound, and then yielded at least fifty per cent. It can also be made into ropes and cordage by being swingled only, and *thought* to be stronger than Hemp. It will yield a thousand pounds to the acre in its natural soil, (by estimation) only broken and swingled, and five hundred pounds when dressed fine enough for six hank yarn."

These are all the testimonies in its favour which I possess, and these have probably been given to the public in the papers, which I have not seen. The product is by *estimation* and in its native soil. But some experimental knowledge of the value and

product of this plant is necessary, before the farmer will venture to try it as a crop. In the rotation of crops, every plant, except that which is intended to occupy the ground, is considered, and is, in fact, a weed, as whatever it may be, it tends to diminish or deteriorate the crop with which it is mixed. If the farmer should try this Nettle, and find it not to answer his expectation; and if it should increase from ten to twenty fold, by its *perennial* roots, and five hundred fold, from the seeds, as Mr. Whitlow in his letter says it will, it may be rationally inquired, how is he to free his soil from so prolific and so pernicious a tenant as this would prove? For it is important to the farmer to have his ground effectually freed from a preceding, as it is perfectly to occupy it with a succeeding crop. I am therefore induced to think that the *annuals*, Hemp and Flax, for the purposes to which they are applied, cannot be superseded by the plant in question, till its claims to superiority are substantiated by decisive experiments on a large scale.

I am, dear Sir, very respectfully,

Your obedient Servant,

W. D. PECK.

THE FOLLOWING LETTER CORROBORATES THE ASSERTION ABOVE, THAT THE APPLICATION OF SOME SPECIES OF THE NETTLE TO THE USES FOR WHICH MR. WHITLOW RECOMMENDS HIS URTICA, IS NOT NEW.

East-Andover, District of Maine, October 18, 1813.

SIR,

Early in the spring of 1811, Capt. Samuel Poor of this town, discovered on his interval something resembling the coat of Flax. It appeared uncommonly strong, considering it had lain out all winter. Enough was collected to spin a number knots of thread; it spun well and appeared strong. The next spring some pains were taken to ascertain the plant, but without success. Some time the last year we saw some accounts published of a discovery said to be a substitute for Flax, and was called the *Urtica Whitlowi.* Knowing that the Nettle grew spontaneously on our wild low land, by observing this last spring, we found the old stalk of the Nettle covered with a strong Flax-like coat, and at the root of which sprung up the young shoot of one of our most common species of the Nettle. Some of which, (among bushes and other

weeds, grew this summer upwards of five feet high. We also find that the Indians about us have been in the habit of using it for their "tump" lines and cords, and that it grows in the wilderness. It grew this summer in bunches on our interval with our clover and other grasses, and appeared to spring from the roots of the last year's stock.

We have inclosed some of the seeds with the leaf, and some that was taken from the last year's stock, and also some we put into the water to rot. It lay in dead water in a very hot place eleven days, and when taken out appeared quite too rotten, which we imputed to the small quantity and warmth of the water. We then let it lay on the ground seven days and dressed it out, some of which we have inclosed, marked A. Whether it can be improved by cultivation, and whether it will be worth cultivation, time must determine. If, gentlemen, you should think a further investigation of the subject of any importance, and will give us some direction or information on the subject, (as we have not now the short account published in our Newspaper,) we shall take it as a favour.

We have been, for these few years past, trying to raise an orchard, but have made but little progress, owing in part to our severe winter, and in the summer to a small green insect resembling lice. The lice are *constantly* attended by the small pismire, which appears to nurse them, and as some suppose to produce them. Is there any method yet discovered to protect the trees from blasts of the winter, or the devouring insects of the summer?

We have an excellent country for the cultivation of sheep, and are just beginning to raise the merinoes. We, however, have no experience; we know not the disorders to which they are liable, nor the remedies. Is there any late and approved Treatise on the subject? Where can they be had and what is the price?

We are, gentlemen, with the highest respect,

your obedient servants,

By order of the Trustees of The East-Andover Agricultural Society,

EBEN POOR, *President.*

ON THE CULTURE OF CARROTS,

AND THE USE TO BE MADE OF THEIR TOPS.

THE following papers having found admittance into the most respectable agricultural publications in Great-Britain, and the facts stated being of great importance in the economy of agriculture, we thought it our duty to lay them before the publick. We do not know whether the citizens of this State at large, precisely apprehend the character of the publications of the Massachusetts Agricultural Society; they are intended chiefly to promote what, we fear, we have been too deficient in throughout our country, a spirit of inquiry and investigation.

While we could wish never to advance opinions, or encourage statements of agricultural precepts which are not founded in experience, we feel ourselves obliged to give to the publick any ingenious experiments or speculations which promise to be of publick utility.

To wait in every case until experiments shall have been made in our country, before we lay before the publick the discoveries or pretended improvements in other parts of the world, would be a policy too cautious for the interests of agriculture.

It ought not to be overlooked, that but a very few of our citizens have access to the European publications, and the limited number of the Trustees of this Society forbids the expectation, that they should make all the experiments suggested by a million of ingenious men who are employed in England, France, and the rest of Europe, in making valuable discoveries in this most useful branch of human knowledge.

We have thought that we could not do a more acceptable and useful service to the State, than by laying before the citizen-cultivators of this State, such experiments and remarks of European cultivators as should seem to promise any important advantages to the agriculturalist. With this view we have selected among some others the following, because we are well convinced, that a much more extended cultivation of the Carrot would be extremely useful and profitable in our country. There are but

few plants which will stand the severity of our frosts. The Turnip, so important to the raising of sheep in England, cannot be left in our fields as winter fodder. But the Carrot, after being used till the frost shall close the ground, may be used as soon as the spring opens without any labour for its preservation. Perhaps it would not be amiss, though not absolutely necessary, to cover the beds with a thin coat of sea-weed or any other litter.

If to the other advantages derived from raising Carrots, proved beyond doubt to be one of the most profitable crops which can be produced, you could be certain, as the following communication would seem to shew, that their tops prove an admirable fodder for milch cows, without materially impairing the amount or value of the crop, it would, without question, be the most valuable plant which the farmer could possibly cultivate.

On this point, however, we not only have our doubts, but we are almost incredulous. Our doubts, however, ought not to prevent our laying the speculation and experiments before the publick, in order that ingenious and enterprising farmers may be induced to make the experiment.

Our doubts arise partly from this experiment's thwarting all the received theories on the subject of the growth of vegetables, and partly from some facts and experiments which have a great analogy to those now communicated, and which had an opposite result.

Upon the modern and now fully established notion of the manner in which vegetable circulations are carried on, namely, that the sap ascends in the centre of the plant, and descends through the bark, an opinion now rendered not only certain, but very familiar in our own country by the practice of girdling the vine in order to accelerate its maturity, it would seem to us, that the cutting off or destruction of the branches or leaves of a tree, or the green part of a plant, must most essentially impede and check, if not destroy, its growth. Such we see every day to be the effect of the destruction of the leaves of trees by caterpillars, and the various larvas of numerous classes of insects.

That the Carrot should be an exception to this rule, appears to us improbable.

A similar opinion prevailed with respect to the Potatoe. One of the Trustees of this Society made a fair experiment this summer on this point. He planted two rows of Potatoes. When

they were about two feet high, he cut one off with the scythe. They were equally well situated and treated, and in an highly cultivated garden. The one which was not cut produced a tolerable crop; the other scarcely any. The value of the tops, had they been good fodder, would not have balanced the loss upon the roots. Still the allegation in the succeeding paper is so positive, the question of so much importance, that if as good a crop of Carrots can be obtained, and the milch cows of a farm also supported during the summer on the tops without pasturage, the gain in a grazing country, or one which raises cattle, would be immense. Very interesting, indeed, is it to us now, when our farmers will, many of them, wish to fill their pastures with Spanish sheep, and yet would hardly be willing to relinquish their dairies. In a State where the inhabitants are so generally intelligent, there must be many who, upon reading the two essays on the culture of the Carrot now published, will be willing to devote one acre to the experiment, and to try it both by cutting and not cutting their tops. The result of any such experiments will be gratefully received by this Society, in the natural, simple, unaffected language of a farmer.

FROM THE RETROSPECT OF PHI. CHEM. AND AGRIC. DISCOVERIES FOR 1811.

Mr. Burroughs having considered it an object of national importance, to diminish the quantity of land necessarily employed in producing food for sheep, horses, and horned cattle, set about raising Carrots, and the success with which his practice was attended, induced him to communicate the result of his experience to The Board of Agriculture.

His mode of cultivation is to appropriate the seed from eight to ten pounds per acre; and having weighed the seed, and collected *fine sand* or *fine mould*, he mixes this quantity of seed with two bushels of the sand, about a fortnight or three weeks before the time he intends sowing, taking care to have the heaps turned over every day, and the outsides sprinkled with water each time of turning them, that every part of the sand heaps may be equally moist, and that vegetation may take place alike throughout, and during this time the land is preparing with a good dressing of manure, of sixteen large loads to the acre. He ploughs the first

time in autumn, and the second time in the early part of the month of February, if the weather permits, carting on the manure at the time of sowing, which is about the last week in March, or sometimes as late as the second week in April; but early sown crops are generally the most productive.

In consequence of the seed being prepared beforehand, it is in a state of forward vegetation, and therefore lies but a short time in the ground, and by quickly appearing above ground, is more able to contend with those numerous tribes of weeds in the soil, where seeds are of quicker vegetation. In about five or six weeks the Carrots are ready for hoeing, and this operation is performed three and sometimes four times, or until the crop is perfectly clear; the first hoeing is with hoes four inches long, and two and a quarter inches wide; the second, which invariably takes place as soon as the first is completed, with hoes six inches long, and the same width as the former; and the Carrots should now be left at least nine inches apart from each other. After the hoeing no expense attends the crop till the taking up, which is usually about the beginning of October. They are given to the cart horses at the rate of about seventy pounds weight of Carrots to each per day, some being sliced in the cut chaff or hay, and the remainder given whole at night, with a small quantity of hay in the racks; and horses kept in this manner are found to enjoy uninterrupted health, and to do as much work as when kept wholly on corn and hay; and in this way an able Norfolk team horse fully worked two journies a day, winter and summer, may be kept the entire year round upon the produce of only one statute acre of land.

This gentleman has also applied Carrots with great profit to the feeding of hogs in winter, and by that means has made his straw into a most excellent manure, without the aid of neat cattle; and has likewise tried a successful experiment in feeding four Galloway bullocks with Carrots, against four others fed in the common way with Turnips and Hay.

The taking up of the crop is performed with three-pronged forks, and the tops are cut off and laid in separate heaps from the roots, ready for carting; but no more is taken up in autumn than to have a store, to last out any considerable frost or snow that may happen in the winter months; the rest of the crop is left in the ground, as in this state they are considered preferable

both for horses and bullocks; and for the former it would be advisable to wash the roots if they be very dirty. And if the Carrots vegetate in the spring before the whole be consumed, this may be prevented by cutting off the crowns.

An account of the expense of culture and of the produce of a Carrot crop is given for each of the years 1806, 1807, 1808, and 1809. The average expense was about £ 10 13*s* per acre, (8 46 78.) The produce from nine hundred to seven hundred and sixty bushels: and the average profit per acre is estimated at nearly *twenty-eight pounds*, (8 124 44.) The experiments are all accurately detailed, and fully support the previous assertions of the writer.

FARTHER REMARKS ON THE CULTIVATION OF CARROTS, BY MR. KERSHAW, EXTRACTED FROM THE FOURTH VOLUME OF THE PUBLICATIONS OF THE BOARD OF AGRICULTURE.

He says, the country in general seem strangers to the utility of Carrots, in rich deep sandy soils in which they delight. If new land is broken up, it should be dry at least a foot deep, previously paring off the turf and burying it in the trench, after the loose earth is shovelled from the bottom—Lay it then in ridges, that it may be meliorated by the frosts, &c.—In March following, dig it a second time; not so deep as to bring up the turf; then sow your seed, first rubbing it between your hands with some dry earth, to prevent the grains from adhering together, which they are apt to do by forked hairs on their bodies. This should be done on a calm day, otherwise they might be blown into heaps; after which, tread the ground and rake it smooth. When the plants are come up, they should be hoed out at the distance of four or five inches, as it is not only necessary to set them singly, but this greatly promotes their growth. In about three weeks after, you may hoe them a second time; and if you wish them to be large, they should be left eight or nine inches distant every way, and continue to keep them clear from weeds. The thiner they stand, the larger they will grow. I remember once to have weighed three Carrots, which together were more than ten pounds. In November, when the weather is dry, take them up, cut off their tops, and pile them horizontally in a groove, to what thickness you like; cover them well with earth, upon which lay straw to prevent wet getting in. If

your situation is not dry, lay them on the surface and cover them as above directed, making a ditch round them to carry off the water—Carrots will stand most winters very well upon dry soils. If suffered to freeze they will rot, but not if the ground is dry. They are excellent food for horses and sheep, and only want to be in more general use to shew their intrinsic value. They are far superior to every other thing given to stock, (corn excepted.)

THE FIFTH VOLUME OF THE PUBLICATIONS OF THE BOARD OF AGRICULTURE, CONTAINS THE FOLLOWING COMMUNICATION, FROM A REV. MR. ELDRIGE.

Mr. Arthur Young has given a great deal of useful information concerning the mode of feeding cattle in the yard, with green fodder; but in treating of the Carrot, he has entirely overlooked the great value of this most useful root.

I hope you will not think me obtruding too much on your time, if I point out to you and the Board, its great good qualities for feeding. My ideas are not theoretical, as I have tried it for the last six years. In the year 1800, being in want of grass for a little Welch cow, as my land was all for hay, and having ten beds of Carrots in a new garden, I had the tops mowed off a little above the crown, so as not to injure by the scythe the head or crown of the roots; this, I need not inform you was a very luxuriant food for the cow; but I thought, and so did the servant who milked the cow, that she gave more milk when she had the Carrot top, than she had done before. The Carrot again yielded a fine luxuriant green head, which I treated in the same manner in October. I found when the Carrot itself was taken up, that it was equally as large and heavy, as a bed which I had reserved from cutting was. The gardener, who had been averse to cutting off the tops, was convinced it had not injured the root, but thought it had benefitted it rather than otherwise; as he had an opportunity of hoeing and clearing of them from weeds, better than he could when they had their tops on them—I am therefore convinced by experience, that the agriculturalist who grows a quantity of Carrots, loses a great quantity of most excellent green fodder for his cattle, by not mowing the tops of the Carrots off twice within the year. I trust you will, as the season for sowing is coming on, communicate this information in such a manner that this most valuable root may be better understood,

and of course more cultivated by the farmer than it has been; for I do not hesitate in stating, that a good crop of ten acres of Carrots, by being mowed, will keep ten cows, in good green fodder, the months of June, July, August, September and October; then the root itself will be found a very useful food during the winter months, for its sweetness causes a great flow of milk, and also it creates a sweetness in the milk, which the grass in general, commixed with the Dutch clover, has not. The farmer will also find that his horses and his pigs will eat it with avidity, and thrive well on it, as I can state from experience.

METHOD OF CHEESE MAKING.

[Selected.]

THE milk is universally set for cheese as soon as it comes from the cow.

The management of the curd depends on the kind of cheese: thin cheese requires the least labour and attention.

Breaking the curd is done with the hand and dish. The finer the curd is broken the better, particularly in thick cheeses. The best colour of this kind of cheese is that of beeswax, which is produced by Annotta, rubbed into the milk after it is warmed. The dairy woman is to judge of the quantity by the colour of the milk, as it differs much in strength. The rennet is prepared, by taking some whey and salting till it will bear an egg; it is then suffered to stand over night, and in the morning it is skimmed and racked off clear; to this is added an equal quantity of water brine, strong as the whey, and into this mixture, some sweet briar, thyme, or some other sweet herbs, also a little black pepper and salt petre; the herbs are kept in the brine three or four days, after which it is decanted clear from them. Into six quarts of this liquor four large calves' bags, or more properly called calves' stomachs, are put. No part of the preparation is heated, and frequently the calves' bags are only steeped in cold salt and water. Turning the milk differs in different dairies, no two dairy women conduct exactly alike.

Setting the milk too hot inclines the cheese to heave, and cooling it with cold water produces a similar effect. The degree of heat is varied according to the weather. The curd when formed is broken with what is called a treple cheese knife. The use of this is to keep the fat in the cheese; it is drawn the depth of the curd two or three times across the tub, to give the whey an opportunity of running off clear; after a few minutes the knife is more freely used, and the curd is cut into small pieces like chequers, and is broken fine in the whey with the hand and a wooden dish. The curd being allowed about half an hour to settle, the whey is laded off with the dish, after it is pretty well separated from the curd.

It is almost an invariable practice to scald the curd. The mass is first broken very fine, and then the scalding whey is added to it, and stirred a few minutes; some make use of hot water in preference to whey, and it is in both cases heated according to the nature of the curd; if it is soft, the whey or water is used nearly boiling; but if hard, it is used only a little hotter than the hand. After the curd is thoroughly mixed with the hot stuff, it is suffered to stand a few minutes to settle, and is then separated as at the first operation. After the scalding liquor is separated, a vat, or what is often called a cheese hoop, is laid across the cheese ladder over the tub, and the curd is crumbled into it with the hands and pressed into the vat, to squeeze out the whey. The vat being filled as full and firmly as the hand alone can fill it, and rounded up in the middle, a cheese cloth is spread over it and the curd is turned out of the hoop into the cloth; the vat is then washed and the inverted mass of curd, with the cloth under it, is returned into the vat and put into the press; after standing two or three hours in the press, the vat is taken out and the cloth is taken off, washed, and put round the cheese, and it is replaced in the vat and in the press. In about seven or eight hours it is taken out of the press and salted, the cheese is placed on a board and a handful of salt is rubbed all over it, and the edges are pared off if necessary; another handful of salt is strewed on the upper side, and as much left as will stick to it; afterwards it is turned into the bare vat without a cloth, and an equal quantity of salt is added to it, and the cheese is returned into the press; here it continues one night, and the next morning it is turned in the vat, and continues till

the succeeding morning, and is taken out and placed on the dairy shelf; here they are turned every day or every other day, as the weather may be. If it is hot and dry, the windows and door are kept shut, but if wet or moist, the door and windows are kept open night and day.

Cleaning the Cheese. The cheeses having remained about ten days after leaving the press, are to be washed and scraped in the following manner; a large tub of cold sweet whey placed on the floor, the cheeses are immerged in it, where they continue one hour, or longer if necessary, to soften the rind. They are then taken out and scraped with a common case knife, with great care, so as not to injure the tender rind, till every part of the cheese is smooth; they are after the last operation rinced in the whey and wiped clean with a coarse cloth, and placed in an airy situation to dry, after which they are placed in the cheese room. The floor of the cheese room is generally prepared by rubbing it with Bean or Potatoe tops, or any succulent herb, till it appears of a black wet colour; on this floor the cheeses are placed, and are turned twice a week, their edges are wiped hard with a cloth once a week, and the floor is cleansed and rubbed with fresh herbs once a fortnight. They must not lie too long, or they will stick to the floor. This preparation of the floor gives the cheese a blue coat, which is always considered as of great consequence.

STILTON CHEESE.

[Selected.]

TAKE the night's cream and put it to the morning's new milk with the rennet; when the curd is come, it is not to be broken as is done in other cheeses, but is to be taken out of the whey as whole as possible with a large dish, and placed in a sieve to drain gradually, and as it drains keep pressing it gently till it becomes dry and firm; then place it in a wooden hoop, afterwards, to be kept dry on boards and turned frequently with cloth binders round it, which are to be tightened as occasion requires; these cloths are kept on, but often shifted for clean ones, till the

cheese acquires firmness enough to support itself; after which it must be rubbed twice every day with a brush for two or three months.

METHOD OF SALTING BUTTER.

BY J. ANDERSON.

[Selected.]

TAKE Sugar one part, Nitre one part, and clean strong Salt two parts, beat them well together and put by the preparation for use; of which take one ounce for every sixteen ounces of butter, and mix it thoroughly with the butter as soon as it is freed from the butter milk. Butter salted in this manner and put down in close tubs, with a little melted butter poured over the surface, to fill up every little vacuity, before the top is put on, will keep good for many years. Butter prepared as above is not fit to be used till after it has stood at least a fortnight, but may then be kept perfectly sound for many years.

INQUIRIES.

With a view to collect the most accurate information on the principal branches of Agriculture, as now practised, and thus be enabled to propagate the knowledge of whatever shall be found useful; and to open the way for future improvements, the following Inquiries were some time since addressed to gentlemen in various parts of the State, by the Trustees of the Massachusetts Society for Promoting Agriculture. The answers subjoined are from a highly respectable correspondent, Justin Ely, Esq. of West-Springfield.

Question 1. OF what quantity of land do the farms in your vicinity generally consist?

Answer. From twenty to eighty acres.

Q. 2. What is the quality of the soil?

A. As in all parts of intervale, a good rich loam near streams. The greatest part is a light sandy loam—some pine plain—a

little mountainous and rocky. Where the plaister of Paris has been applied to grass lands, the produce of grass is much increased; one bushel to the acre, sown late in the fall or early in the spring, will commonly double the crop: and when the same lands are ploughed up, after two or three years, the crops of grain are much increased thereby. By this course the lands are annually made more productive and valuable. Some people put on about seven loads of manure to the acre, and sow one bushel of plaister of Paris thereon, and the subsequent crops are thought to be as good as twenty loads of manure would produce without any plaister. Plaister is frequently sown in the spring, on Winter Wheat, Rice, Buck-Wheat, Hemp, Flax, &c. one bushel to the acre, with very good success.

Q. 3. Into what portions of pasture, mowing and tillage, orcharding and wood, are farms usually divided? Are the orchards improving or declining? Do they yield a competent supply of cider?

A. Pasturage, one sixth; mowing and tillage, one third; orcharding and wood, the remainder. Young orchards improving, old ones declining. More cider is made than is consumed in the town; considerable is distilled, the remainder sold or sent to market.

Q. 4. How much land on each farm is annually (on an average of years) planted or sown with grain of any kind?

A. One third is sown or planted.

Q. 5. In what manner is the land prepared, manured, and seeded with each kind of grain, and what is a medium crop?

A. For planting, the land is ploughed only once; for Indian Corn, a small part is dunged in the holes. Plaister of Paris is frequently put on after the first hoeing, (from a tea-spoonfull to a table-spoonfull to a hill; this is sometimes repeated after the last hoeing.) Crops, from fifteen to forty bushels an acre. Much Rye is sown on light land, ploughed and hoed in where Indian Corn is growing; the crop from five to fifteen bushels an acre. Wheat of the common kinds is raised on new lands lately cleared; the crop from twelve to twenty bushels. Early Virginia Wheat is considerably raised on old manured lands, and also where the sward of mowing and pasture lands have been turned over. It is commonly ploughed and harrowed twice

or thrice, without disturbing the sward which has been ploughed under; crop, from fifteen to thirty bushels.

Q. 6. In what manner is Indian Corn cultivated, and what is the medium crop on an acre?

A. Dr. Jared Elliot gives the following receipt to prepare seed Corn, to secure it against crows, blackbirds and vermin, viz. Take the roots of Swamp Hellebore, called Skunk's Cabbage, boil them in so much water as to keep them covered an inch deep; boil it two hours, then strain out the liquor, put in the seed Corn while the liquor is warm, steep it twenty hours, it is then fit to plant. Destroy all that is left; hogs, sheep and fowls, have been killed by eating it. Some Indian Corn is dunged in the holes at planting, but not generally. For the first hoeing, the land is harrowed by a horse, with a small harrow; for the second hoeing, the land is ploughed away from the rows, into the middle space, with a one horse corn plough; at the third hoeing, the ground is ploughed from the middle spaces to the rows. Crop, from fifteen to forty bushels. Some plant the rows from five to six feet apart, in squares, and plough both ways to the rows. Seed Corn should be gathered from the first which ripens, where two good ears grow on one stalk, that the crop may all ripen at the same time. Such seed Corn will generally produce two ears on a stalk. It should be gathered early, before the general gathering of the field.

Q. 7. What is the quantity and value of the Straw on an acre of Barley, Rye, Oats and Wheat, *respectively?* And to how much upland Hay are they *respectively* equivalent for fodder?

A. Barley, one and a half loads; Rye, one load; Oats, one load; Wheat, one and a half loads; very little is cut up for fodder; some is stacked up where cattle eat of it; some is used for litter for stables; but it is generally put into the yard as it is threshed. Barley, Oat and Wheat straw equivalent to one-sixth or one-eighth their quantity of upland Hay for fodder; Rye straw, from one-eighth to one-twelfth.

Q. 8. What is the value of straw of each kind, for any purpose, *other than fodder or litter?*

A. A little is used for making Cider and binding Hemp.

Q. 9. What is the value of the stover or stalks on an acre of Indian Corn, and to what quantity of upland Hay is it equivalent for fodder?

A. From one dollar an acre to one dollar fifty cents, equivalent to one-quarter or one-third the quantity of upland Hay, if well saved.

Q. 10. What quantity of land, on a medium farm, is annually planted with Potatoes?—How is the land prepared?—What quantity and kind of manure is applied to an acre, and in what manner?—How much seed is used, and how is it selected?—How are they cultivated, and what is a medium crop?

A. From one to three acres, generally the land is only ploughed. Sometimes coarse manure is ploughed in; eight to twelve loads straw or coarse manure to the acre are sometimes put in the holes at planting. Seed, twelve to sixteen bushels to the acre; the largest and best are selected for seed. Planted in squares; the rows three to three and an half feet apart, howed but twice, ploughed both ways to the rows—crop from hundred to two hundred and fifty bushels to the acre. A new kind of pale red, long Potatoes, with eyes all over them; some branches or prongs on some of them grow very long and large, produce from three hundred to five hundred bushels to an acre on land well manured. A new method is recommended: put on fifteen or twenty loads of coarse yard dung on an acre, plough it in; then plough furrows three to three and an half feet apart, put such manure in the bottom of the furrows, on which plant Potatoes nine or ten inches apart, cover them with similar manure; cover the whole by turning back the furrow. At hoeing plough the earth to the rows. When fit to gather, with a hog-plough lay open the rows by turning a furrow each way; gather what Potatoes are uncovered, then harrow down the furrows lengthways, then gather again produce from three hundred to five hundred bushels an acre. The culture of Potatoes is rapidly increasing; they are found more profitable to make stall-fed beef than Indian Corn; are better tallowed and fatten sooner.

Q. 11. How many bushels of Potatoes are equivalent, ordinarily, to one bushel of Indian Corn, for sale?

A. From three bushels to four.

Q. 12. How many days labour of a man are usually employed on an acre of Indian Corn, including the getting in all the Stover and stripping the husks from the ears?

A. From six to nine days.

Q. 13. What is the labour of shelling a hundred bushels of Indian Corn, and in what manner is it performed?

A. If threshed on a barn floor as usual, two days and an half, or three days. Some people tread it out with horses to save labour.

14. *Q.* How many days labour of a man are usually employed on an acre of Potatoes, including the getting in the crop?

A. From ten to twelve days, and sometimes more.

Q. 15. Is there any order or succession of crops known to be beneficial or pernicious to the soil?—If any, what is it?

A. Grain is beneficial when the stubble is soon ploughed in, also red Clover. Indian Corn, Oats, Flax, Turnips, Potatoes, and Hemp impoverish land.

Q. 16. What is the usual course of crops?

A. Grass ground is ploughed up in July or August after the second or third crop, on which early Virginia wheat is sowed in September, or the next spring Indian Corn, Flax, Potatoes, or Hemp. Rye is commonly sown among Indian Corn. After two or three crops of tillage, it is sown with English Grain, Oats, Barley or Flax, with red Clover and Herds Grass, if designed for mowing; if for feeding, with red Clover and English Spear Grass, and white Clover.

Q. 17. What is the medium quantity of Hay produced on an acre of upland, and what is the labour of mowing, curing and housing it?

A. From twenty to thirty hundred; labour from three to four days.

Q. 18. What is the medium product of Hay, on an acre of fresh meadow; and what is the labour of mowing, curing, and housing, or stacking it?

A. Thirty to forty hundred; labour four or five days.

Q. 19. What is the proportion of value which fresh meadow Hay bears to upland Hay, each being of a medium quality?

A. About two thirds.

Q. 20. Is any tillage land laid down with Grass Seeds, without sowing grain at the same time? If so, which method is found best?

A. Very seldom; to sow with Grain or Flax is thought best, as one crop is saved thereby.

Q. 21. What are the kinds of grass cut on the upland for Hay? What proportion is from seed sown by hand, and what are the kinds thus sown, and in what quantities *respectively* per acre?

A. Herds Grass, sometimes called Fox-Tail and red Clover. Sometimes white Clover or red top are mixed with them; the quantity, three or four quarts of red Clover-seed, with one quart or three pints of Fox-Tail, with a little of the other kind occasionally. Much red Clover-seed has been sown and left uncovered on the surface, or very slightly covered: if the following season is wet it may answer, but if dry it generally fails. The following method is now practised in this vicinity, viz:—The Clover-seed is continued in water, till it vegetates and the roots appear; it is then rolled in ground Plaister of Paris, and then mixed with the grain, and both are sown together soon after they are mixed, and immediately ploughed under furrow: many vegetate their grain also before it is sown. In Staunton's History of the Embassy to China, it is said the Chinese never commit this seed to the ground till it vegetates. I have known wheat so much grown as to adhere together, and be separated by hand before it could be sown, yet it came up uncommonly well and without any loss. The late Dr. Jared Elliott, of Killingsworth, in his Essays on Husbandry says, "Red Clover seed should be ploughed in furrows deep. It will grow from the depth of the furrow; is then more secure against being killed by draught or the winter; it will then produce larger stalks, more hay and seed, and more manure when ploughed in." On light loams or sandy land, it answers well. I have my doubts whether it will answer in clay soils or heavy loams; experience will determine. It answers well to plough with wheat or rye in the Fall, if the land is not very fertile; but on rich ground it will sometimes choak and ruin the crop, as I have repeatedly experienced. But if sowed and ploughed in with grain in the Spring, it will not endanger the crop.

Q. 22. Are any grass lands *new* seeded after scarifying them with the harrow only, or in any other mode, without ploughing? And what is the success of such practice?

A. None are done so. Sometimes stiff English swards are harrowed or dragged in the spring to loosen the sward with good success, but no seed sown thereon. But if scarified or dragged considerably, it would probably answer to sow Hay-seed.

Q. 23. What weeds, vermine or insects infest the mowing lands?

A. Docks which are pulled up by hand before the seed ripens, when the ground is soft after a shower of rain, also silk grass or milk weed. Saint John's wort sometimes diminishes the crops of grass. They may all probably be destroyed by cutting as mentioned in No. 25 and 47.

Q. 24. Are the spontaneous or cultivated grasses infested most?

A. The cultivated most, especially the red Clover by wood chucks and large black bobtailed mice.

Q. 25. What methods are used to destroy weeds, vermine or insects without ploughing the land, and what is their success?

A. Weeds, and alders, elders, briers, &c. as mentioned in No. 47. Milkweed or silk-grass is destroyed by cutting off the tops between the first and second mowing; when it is higher than the grass, it is cut off with a scythe without injuring the grass, with the third cutting at the second mowing it will bleed to death. The Saint John's wort, of which Judge Peters says, "He knows no plant in the pestiferous catalogue so exhausting and destructive," may probably be subdued by three cuttings, as mentioned in No. 47, and probably all other weeds, and bushes, and briers, &c.

Q. 26. What kinds of beasts, and in what numbers are they respectively, kept on medium farms? And how are they subsisted?

A. Horses, horn cattle and sheep are pastured in summer and kept on Hay, &c.; in winter their numbers are in proportion to the produce of the farm; hogs are pastured in summer, and fatted in the fall or winter on boiled potatoes, meal, and corn at a distance from the salt-water. Fine salt should always be kept in water-tight troughs in pastures where cattle, horses, hogs and sheep are kept, which should be staked down; all the stock will eat a little every day, and be in higher flesh; cows will give more milk, oxen and horses will do more labour, and better endure the heat. A large and respectable farmer informed me, that every hoof which went on his farm, was one third the better in consequence of his adopting that usage. It is very advantageous in fatting cattle.

Q. 27. In what place and in what manner are the cattle fed with the coarse winter fodder? Is it given in the stable, in the yard, or the field? Is it chopped or given whole?

A. As much of the stock is stabled and fed there as is convenient, the remainder are foddered in the yard; the fodder is not chopped, but given out whole. Sheds are made in barn yards, and the fodder is put into mangers for the cattle. Very little Hay is stacked out, and where it is, it is so near the barn yard as to be foddered out in the yard.

Q. 28. How much butter is usually made in a year from a cow, all the cream being churned? And how much skim-milk cheese is made from this same cow?

A. None are so managed here—I have known two good cows well kept on grass, make more than five hundred pounds of cheese in a season, besides furnishing a plenty of milk and butter for a small family of six or seven.

Q. 29. What food is given to sheep besides grass and hay?

A. Mostly potatoes—a little corn. But if corn or potatoes are given to ewes when their lambs are two or three weeks old, too freely, it makes their milk so thick, that their lambs can get none of it and die.

Q. 30. What is the value of the subsistence of a sheep through the year, besides the pasturage?

A. From one dollar to one dollar fifty cents.

Q. 31. What is the value of pasturage for a sheep compared with the pasturage of a cow?

A. Six or seven sheep to one cow.

Q. 32. What is the ordinary weight and value of the flesh of a sheep when fit for the butcher? And what is the quantity of wool in a fleece?

A. From forty to sixty pounds weight the carcass, at five cents a pound. From two to three and an half pounds of wool.

Q. 33. What breed of swine are propagated? How are they fed? How fatted? At what age are they killed; and what do they then weigh?

A. The small boned, thorn backed, with small feet and ears, are esteemed the best to keep twelve months, and will then weigh from twelve to fourteen score, if well fatted. They are pastured in the summer and fattened in the fall or winter, on boiled potatoes mixed with meal, or Indian Corn or meal; some

few people use peas soaked or ground—soaking is preferred. Potatoes being washed are boiled in iron barrel kettles, made thin and set in furnaces; two pails of water only are put in with a pint of salt; the potatoes are heaped on the top, and a tub bottom upwards closely covers them. One armfull of dry wood will boil out all the water, and dry them like roasted potatoes—the steam will do all above the water. The hogs, horses and cattle like them best done this way, and they are said to yield much more nourishment. Done in this way, they are said to be as good for horses as oats of the same quantity—experience will determine it. The best pastures for hogs are of red Clover and white Clover.

Q. 34. What number of bee hives are kept? What is their product in honey and wax? What is the management, and what are the obstacles which discourage their extensive propagation?

A. Very few are kept; they do not generally prosper; many die in the winter; some are destroyed by mice.

Q. 35. What is the usual quantity of land sowed with Flax-seed? How is it manured and cultivated; and what is the medium produce of Flax and seed in quantity and value?

A. From one quarter of an acre to an acre to a farm. The ground is prepared by repeated ploughings and harrowings, manured with ashes and chip manure, sometimes with other old and rotten manure. An acre commonly yields from two hundred to two hundred and fifty pounds, and five or six bushels of seed. Flax is worth from ten pence to a shilling a pound; Flax-seed, from six to seven shillings a bushel.

Q. 36. How much labour is employed on a quarter of an acre of Flax, before it comes to the spinner, and including the preparing the seed for market?

A. From seven to eight days labour.

Q. 37. In what articles consists the Surplus of the farmer, which is sold or exchanged for other articles?

A. Horses, cattle, sheep and swine, grain of all kinds, beef, pork, mutton, hemp, flax, potatoes, cider and apples, &c.

Q. 38. How many loads of manure are collected (estimating thirty bushels to a load,) from the cattle in the barn yard, of a medium farm, in a year, specifying the number and kinds of cattle kept on the same farm, and the manner in which they are kept in relation to confinement or ranging abroad?

A. Ten head of horned cattle, with three horses and ten sheep, kept up in the barn yard, and fed on straw, hay, &c. will make from thirty to forty-five loads.

Q. 39. What quantity of manure is made in the hog-pen? specifying the number of swine fatted, the kind and quantity of food consumed, and the weight of flesh produced?

A. Five hogs kept in a sty with litter, and fatted on boiled potatoes and meal, or corn, to weigh ten score each, will make from six to ten loads of manure.

Q. 40. What methods are used to enlarge the quantity, improve the quality or prevent waste of the manure, made in the barn-yard or hog-pen, and especially to save the stale of the cattle?

A. Weeds, leaves and grass turfs, are sometimes put into the barn-yard, and some weeds and straw are put into the hog-pen successfully, by a very few people, but it is generally neglected. No means are used to save the stale of cattle—it commonly mixes with the manure.

Q. 41. Is the manure and tillage labour exclusively applied to the best parts of each farm?

A. It is not. By good management and a proper course of crops, the poor lands are often made valuable and productive. Red Clover and the plaister of Paris will do it, when properly managed.

Q. 42. In what manner and for what purposes is manure used, except those indicated in the foregoing inquiries?

A. Plaister of Paris generally. Clay on light sandy soils, fifty or sixty loads to the acre, when pulverized, will make a valuable and productive loam, especially for red Clover. If the clay is near and easily dug, three men with a team and two carts will put on fifty or sixty loads in a day, *and the land will never forget it.* We have also large quantities of marl, but it is very seldom used; but probably might be very advantageously.

Q. 43. What other manures are used besides those created by the stock, and what are their merits compared with these?

A. Plaister of Paris considerably on nearly all kinds of soils; clay on light sandy land; fifty or sixty loads to the acre when dissolved and mixed will make a productive loam, especially for red Clover which should be ploughed in the whole crop the second year; when part of the seed is ripe, Rye should be sowed thereon. Some of the old plants of Clover will live, and a suf-

ficiency of the seed will grow to fill the land the next year; the first crop of Clover may be mown or fed; the second crop should be ploughed as above; one bushel of Plaister should be thrown on each year; the crop of Rye and Clover will pay all the expenses of the three years tillage; there will be no expense for Clover-seed after the first year.

Q. 44. Is lime-stone found in your vicinity? Is it used as a manure?

A. But little is found; the quality not good; none is used for manure.

Q. 45. Is Buck-wheat cultivated for the food it yields? Or is it used to cleanse the soil from weeds, to fertilize and enrich it, or for any other purpose?

A. Only for the food it yields; it is mostly ground for swine. Some think it an impoverishing crop; grass is said to succeed well after Buck-wheat, but no other crop. When Buck-wheat is sown very thick, one and an half bushels to the acre, and cut before it is killed by the frost and properly secured as Hay, the straw is said to make very good fodder. A respectable farmer, who kept a considerable stock, told me, he cut no hay that his stock was so fond of, as of such Buck-wheat straw. The usual quantity of seed is eight or ten quarts to the acre; by being sown thick the stalks will be small and better for fodder.

Q. 46. In what manner are new lands brought under cultivation? Is it customary to plant orchards in the new settlements?

A. The timber and wood are cut off; the land generally burnt over, then ploughed and dragged so as to pulverize it, then sowed with wheat, and after the first or second crop, laid down to grass; generally red Clover and Herd's grass. Orchards are rarely planted on new land.

Q. 47. How is land cleared, which bushes and under-brush have overrun, since the trees were carried off?

A. By cutting them down. The late Rev. Doctor Jared Elliott, of Killingsworth, in his Essay on Husbandry says, "The best time to cut bushes to kill them, are in the months of June, July, and August in the old of the moon, on the day when the sign is in the heart." He often tried it with success.

Q. 48. What is done with swamps, or swampy lands?

A. Drained if necessary and practicable, then cleared and subdued as mentioned in the preceding article, then laid down to

natural or imported grasses proper for the soil; sometimes ploughed up as soon as cleared, and Potatoes or Corn raised thereon for two or three crops till well subdued, then laid down to grass.

Q. 49. Is the growth of wood for timber and fuel equivalent to the consumption in your vicinity? If not, what measures are taken to provide against the inconvenience of future scarcity?

A. In those towns where cattle run at large on the commons, they eat and destroy most of the sprouts from the stumps of lately fallen trees, except they are inclosed. In West-Springfield and most of the neighbouring towns, by vote of the towns, all cattle, horses, sheep, and swine therein, are restrained from running at large. The owner of the beast must take care of his beast, and is answerable for all the damage done by his beast; and it may be impounded by any person, if going at large on the common. Under this salutary regulation, most of the trees which are cut down have sprouts from their stumps, which in a few years, say from twelve to twenty years, will yield as much wood as was taken from the stumps. As these settlements increase, there is much less destruction of wood while growing in forests by fires purposely or carelessly set. Rooms are generally made smaller and closer than in years past; fireplaces are made less, and stoves of different constructions are multiplied; the price of fuel is increased, and there is greater economy in the expenditure. Also, large fields of grain, clover, &c. are raised without any inclosure, whereby large quantities of wood which used to be expended in making fences are saved. The foregoing circumstances, with others, operates to save the consumption, and prevent the waste and destruction of fuel, so that, perhaps, the growth of timber and fuel is equal to the consumption thereof, in this and the neighbouring towns. If the regulation of restraining cattle from running at large had been adopted much sooner than it has, it would have been an incalculable benefit to the towns and community at large in all the old settlements.

Q. 50. Are wood lots generally fenced, or left open for cattle to range in without restraint? In getting your wood for fuel, do you pick the oldest trees, or do you cut clear? Which method is best calculated to increase the value of your wood lands?

A. No cattle are allowed to run—our wood lots therefore are generally not fenced. In cutting, some used to pick the best trees on common land, on their own land generally the old and decaying. Latterly, the practice of cutting all clear prevails—It will undoubtedly increase the value of our wood lands.

COMMUNICATION,

FROM THE AGRICULTURAL SOCIETY OF EAST-ANDOVER, COUNTY OF OXFORD.

AGREEABLY to your recommendation, the inhabitants of this town and its vicinity have formed themselves into a Society.

The people in this town as well as its vicinity, are almost entirely in the pursuit of agricultural concerns. But in our remote local situation, our very scanty pecuniary resources, and the new and uncultivated state of our little farms, with the want of books and other means of information, little, if any information, can be communicated to your Society. We, however, anticipate much advantage to ourselves by forming more correct habits of thinking and acting, as well as by the aids and communications you may be pleased to afford us, and trust we shall make a good use of all means of improvement.

As a Board of Trustees we have had but one meeting; little therefore can, at this time, be said in answer to your inquiries.* The following are respectfully submitted:—

Answer to question 1. Farms contain about one hundred and fifty acres of land, mostly unimproved.

2. The upland next to the intervale light and dry soil. The intervale good for all kinds of grass and grain, about seventeen acres. Back parts of lots hilly and rocky.

6. Little or no attention paid to Indian Corn.

10. To about one acre, ten or twelve loads manure. Crop two hundred bushels; seed about ten bushels.

11. From four to six bushels of Potatoes.

* The inquiries here alluded to are those stated in the preceding article, to the respective numbers of which those prefixed to these answers will be found to correspond.

18. We have no fresh meadow.

20. None.

21. Herds' Clover, red Top, and foul Meadow in intervale.

22. None.

23. Thistles the most destructive and hardest to kill; grasshoppers the worst vermine.

24. Cultivated.

26. Sheep and horned cattle and horses; about ten horned cattle and fifteen sheep—Fed on hay.

29. None.

30. Ninety cents, or one dollar.

31. About one tenth.

32. About fifty pounds; wool two and quarter pounds.

33. A mixed, ordinary breed, fed on Potatoes mostly; killed at about eight months old. Weight about two hundred pounds.

37. Beef, Pork, and Butter.

44. None found.

45. Just beginning to cultivate.

46. The trees generally felled in June, burnt to the next season, the timber cleared off fit for the harrow, when grain is sown without ploughing.

A species of the Apricot, as we suppose, has been found on Kennebec River; is cultivated in our gardens with little labour, and in the course of four or five years produces a plentiful crop of delicious fruit, about the bigness of a small peach. Some few of the stones we have sent you herewith for your inspection.

ON THE CULTURE OF THE YAM.

Mr. Ely of West-Springfield remarks, that in Willich's Domestic Encyclopædia, under the article *Yam*, is given a particular description of this vegetable. They are said to grow in America, and in the counties of Mid-Lothian and Sterling in Scotland, where they are raised and given to milch cows advantageously, and are cultivated on poor soils, which they meliorate, and prepare the land for a crop of wheat, produce twelve tons to the acre, and on some accounts are preferable to the Potatoe. If they will

flourish in Scotland, will they not, he asks, in New-England? Dr. Willich being a Scotchman, his information of the Yam growing there is probably correct. It is therefore surprising, says he, that they are not cultivated in New-England; and refers to Dr. Willich's description for a more particular account of the Yam.

THE FOLLOWING FROM THE DOMESTIC ENCYCLOPÆDIA IS THE ACCOUNT ALLUDED TO BY MR. ELY.

Yam, or *Dioscorea Bulbifera*, is a native of Ceylon, whence its culture has been introduced into the West-Indies, and other parts of America; it is divided into two varieties, known under the names of *red* and *white*; from the colour of their bulbous roots.

Yams flourish best on poor soils, and retain their beautiful verdure till a late period in the year; hence they are said to meliorate the ground nearly as much as a crop of Turnips. Being propagated by setting the eyes, their culture corresponds with that of Potatoes; and, like these roots, Yams often prove an excellent preparatory crop for Wheat. Farther, they are very productive; so that the red variety yields in general twelve tons per acre: the white sort is less fruitful; but being more delicate, it is chiefly raised for the table in the West-Indies.

The culture of these roots is at present, we understand, confined to the counties of Mid-Lothian and Sterling, where they are given to cows; the milk of which is thus considerably increased without affecting its quality or flavour.

As an article of food, the Yam possesses similar properties with the Potatoe, excepting that it is less mealy. In a raw state it is viscous, but when roasted, this bulbous root is equally wholesome and nourishing, so that the inhabitants of the West-Indies prefer it even to bread. In some respects, therefore, Yams are more valuable than Potatoes, because the former are much lighter and more easily digested:—when first dug out of the ground, then dried in the sun and preserved from humidity, in casks full of dry sand, they may be kept several years uninjured by frost, and without losing any part of their nutritive quality. These beneficial roots may also be pealed, deprived of their moisture by pressure, and dried in the same manner as Mr.

Millington directs Potatoes to be preserved. (See vol. 3. p. 438.) In this manner, Yams may be packed in casks, like flour, and imported in a perfectly sound state from the West-Indies. When grated and mixed with wheaten or barley flour, they may be formed into a light and salutary bread. Nor are they less nourishing when converted into pottage or pudding, with the addition of milk. Thus Mr. R. Pearson, (*Annals of Agriculture*, vol. 35.) informs us, that the meal obtained from the boiled and grated roots, when beaten up with milk and eggs, without any flour, yield a firm and well flavoured dish; which could with difficulty be distinguished from a common batter pudding. By this treatment, the Yams are divested of their saccharine taste, which renders them at first disagreeable to some persons, though such property is on the whole of considerable use; as it saves the expense of sugar.

SUN-FLOWER OIL.

[Extract.]

It appears from experiments made formerly in this State, that a bushel of Sun-flower seed yields a gallon of oil, and that an acre of ground planted with the seed at three feet apart, will yield between forty and fifty bushels of the seed. This oil is as mild as sweet oil, and is equally agreeable with sallads, and as a medicine. It may moreover be used with advantage in paints, varnishes and ointments. From its being manufactured in our own country, it may always be procured and used in a *fresh* state. The oil is pressed from the seed in the same manner that cold drawn linseed oil is obtained from flax-seed, and with as little trouble. Sweet olive oil sells for *six shillings* a quart. Should the oil of the Sun-flower sell for only two thirds of that price, the product of an acre of ground, supposing it to yield only forty bushels of the seed, will be £32, a sum far beyond the product of an acre of ground in any kind of grain. The seed is raised with very little trouble, and grows in land of moderate fertility. It may be gathered and shelled, fit for the extraction of the oil, by women and children.

VARIOUS USES OF THE

HELIANTHUS ANNUUS,

OR

COMMON SUN-FLOWER.

[Translated from a Portuguese work, entitled, Alographia dos Alkalis Fixos, published 1798, at Lisbon, by Jos. Mar. Da. Corse. Veillose.]

1. The sprouts are eaten with oil and salt.
2. Bread is made from its seeds, as also gruel for children.
3. Some American nations eat the seed.
4. The seed gives oil for several uses.
5. It fattens fowls.
6. Its leaves are excellent food for cattle in summer, and increases the quantity of milk in cows; they are easily gathered, being of a large size, the inferior are to be first gathered.
7. They are also good for sheep.
8. Its stems can be used to support climbing plants instead of poles.
9. They serve for fuel. An economist of Frankfort found them as good as willow wood for this purpose. He planted two acres and a quarter, and by that he saved in a winter thirty dollars, and had oil worth twenty-eight dollars.
10. Lastly, they furnish excellent ashes. The seeds when roasted have the flavour of coffee, and the infusion of them in the manner of tea, is a pleasant beverage.

REVIEW.

Advice to Shepherds and Owners of Flocks, on the care and management of Sheep. Translated from the original French of M. Daubenton, by a gentleman of Boston. Boston, printed by Joshua Belcher, 1811. Sold by Bradford & Reed, Cornhill, Boston.

A complete Treatise on Merinos and other Sheep, with plates. Recently published at Paris, by order of the government, compiled by M. Tessier, Inspector of the Rambouillet Establishment and others in France. Translated from the French and dedicated to the Agricultural Societies of the United States. Printed at the Economical School-Office, New-York, 1811. Sold by Bradford & Reed, Cornhill, Boston. Price $1.

THE present high prices of Sheep are to be ascribed, principally, to two causes:—

First, The number of speculators in the market, who buy to sell again.

Secondly, The prevalence of the very erroneous practice of estimating future profits by the past and present, without sufficient regard to circumstances. A number of considerations are to be taken into view, in estimating the value of sheep as a stock for the farmer. These, while they tend to lower the extravagant anticipations of profit, which so many indulge, and to which the speculators allow no limits, cannot fail, on the whole, to encourage the skilful and attentive farmer, to expect ample remuneration from his flock in any circumstances of the country.

Without noticing the effect which a renewal of peace and intercourse with Great-Britain may have to depreciate our manufactures, and lower the prices of wool, we would barely state a few of the causes which, in the actual state of the country, may operate to disappoint some classes of our sheep-holders of their large profits.

And first—We think we have noticed among purchasers, in forming their flocks, too little solicitude to procure the finest wooled, and the finest formed sheep of the different grades, and, in some instances, too little knowledge of the comparative value of the different *grades*. For a few genuine merino sheep of the first quality, as a stock to breed from, almost any price we have ever heard of, will bear no comparison with the profits which may be calculated upon with certainty from them.

In England the difference in value of a sheep of the highly improved breeds, native of the country, and one of a common kind is strikingly great. An ewe, for example, of the *Dishley Farm Breed* sold at auction for *sixty-two* guineas; and *forty* ewes of the same breed, together, for *thirteen hundred and sixty* guineas, while at the same time the price of common sheep was from twenty to forty shillings only.

Of late, the prices paid for wool of every description have been very high. The *Merino* wool of different degrees of fineness, has all borne one price; the wool of the *half blood* and American sheep respectively, has been sold at but one price—the prices being regulated by the *grades*, without regard to the particular qualities of the article. This may have been owing partly to the inexperience of the manufacturers, but principally to the high prices of cloths which have induced the manufacturers to buy up with avidity all the wool at market, secure of an immense profit, whatever might be the qualities of the raw material.

But will this state of things continue? May we not calculate that the manufacturers will learn to discriminate more nicely in their selection of wool, as manufacturing establishments become more numerous, as the quantity of wool at market increases, and motives of interest and pride impel them to vie with each other in the fineness and beauty of their fabricks? Then, will not the flocks, derived from fine *stocks*, become, yearly, more and more valuable, and those from poor *stocks* continually depreciate?

Secondly, In the selection of American ewes for breeding it is observed, that the largest bodied sheep are usually preferred. They require more food than those of a less size; and it has been abundantly proved in England, that small bodied sheep yield a greater quantity of wool, meat, and tallow, on an equal quantity of land than the large.

Thirdly, From the great resemblance which many sheep of the mixed bread bear to the *Merino*, impositions may easily be

practised on those who buy without taking the necessary pains to ascertain the purity of the blood. Repeated experiments, at the sheep establishments of government in France, have shewn, that the progeny of rams of the mixed breed degenerate after a few generations.

Fourthly, It is to be feared that sufficient attention will not be paid to foddering and protecting from the rigour of our winter, the numerous flocks, which have recently passed into new and inexperienced hands, or which, belonging to gentlemen living in the capital, are sent to distant parts of the country, to be kept at a stipulated price. Our apprehension is strengthened by the too great prevalence of an opinion that sheep are able at all seasons *to provide for themselves*, and require no kind of care.

To farmers, and all who are about forming flocks, and whose calculations of future advantage embrace a period of several years, the importance of procuring sheep of the best quality, as an original stock, cannot be too strongly urged. No farmer who keeps sheep and understands his own interest, will fail to purchase one full-blooded merino ram, at least; whatever may be the first cost, he will be amply remunerated in the character of his flock.

If ewes of a higher grade than the common American sheep are beyond his means, let him be careful to select healthy sheep of a broad frame, and rather middling size, with fine fleece. He will reap the benefit of this care in the quality of the first and all the succeeding generations. Hitherto, unfortunately, the finest sheep have been selected for the butcher, and the poorest only kept for breeding. Next to the selection of a proper stock, it will be important to provide abundant food, good pasturage in summer, and grain with pulse to be given with plenty of dry fodder, in winter. Some kind of shelter from the inclemency of the weather, in a climate like ours, is essential to the health and progressive improvement of flocks. With attention to these particulars, and some others, which are urged in the Treatises, the titles of which are prefixed to this article, proprietors cannot fail to derive a steady and constantly increasing profit from their flocks.

We cannot too strongly recommend the purchase of one or both these Treatises. They contain the results of long and careful experience, and cannot be too often consulted by those who would adopt the best means of meliorating their flocks.

That of *Daubenton* is in the form of question and answer, and though designed for the use of proprietors in Europe, who entrust the care of their flocks to shepherds, yet most of the qualities of a good shepherd, as therein described, should be possessed by those, who have the care of sheep in this country or in any other—The contents in general are of universal application.

If we were to make choice of one or other of these publications, it would be that of *Tessier*. It is later than *Daubenton*, and was written under the patronage of the French Government, and with a view, professedly, to impart knowledge, which had been obtained since the publication of *Daubenton*. We shall here give a few quotations from *Tessier*, which will enable the reader to form some opinion of the merit of the work.

"The merino race, known by the name of *Spanish sheep*, is the most esteemed, because it possesses properties, which render it superior to the others. Its size in Spain, when compared with other breeds, is neither the largest nor the smallest, but middling. In France all the dimensions increase according to the distance of time from the period of importation of these sheep, and in proportion to the care bestowed upon them, and the quantity of their food.

"The shape of the merino is rather round; its face is broad and not upright; its back is not arched; its body is broad; its legs are short; some have dewlaps like that on the neck of a stag; some have their cheeks, the lower part of their under jaw, and their forehead entirely covered with wool, which sometimes extends to the eyes; some also have folds upon their shoulders, their buttocks and neck."

"The wool of the Merino is what principally distinguishes it; this wool is very fine, abundant, soft to the touch, very greasy, thick, somewhat spiral, elastic, not so long as that of the common breeds, and of a dirty and brownish white, occasioned by the dust and filth which adheres to it. The whole body of the animal is covered with wool except the arm pits, the flat part of the thighs, and a part of the face. The young ones, especially those of the *second* year, have it to the extremity of their feet. The skin beneath the wool of such as are healthy is of a rose colour. It often happens that in sheep newly imported one may perceive among the filaments of the wool, particularly on the

cheeks, top knot, buttocks, and thighs, shining hairs of a bright grey, which are called *jarre*, or *dog's hair;* in France careful proprietors cause these hairs to disappear, by preventing the copulation of such males or females as have them. This hair must not be confounded with that sort of down which often appears on new dropped lambs, even of the finest breed; when they are two or three months old, this down disappears, and is succeeded by fine wool; those which had the most of it are commonly the best sheep.

"By means of the above characteristicks, it is easy to distinguish a merino from a common sheep; but there is no way of distinguishing it from a mongrel of the fourth or fifth generation; the exterior resemblance is so perfect, that a person who wishes to be assured of a creatures being full blooded, must not trust to inspection alone.

"The merino ewe may live twenty years, and even longer—such longevity is rare; many reach fifteen years, and continue to bear young all the time. The ram might with care be employed an equal number of years, but there is more advantage in making use of none but those which are young.

"It is known that in the animal kingdom the influence of the male upon the offspring is generally very great; it is particularly remarkable in the breed of merinos. Although in the union of the sexes the male and female both contribute to the formation of the fœtus, yet the first generations possess in a more striking manner the characteristicks of the male. If it be wished to continue a remarkably good breed, care must be taken to choose for copulation no rams, but such as possess the qualities it is wished to perpetuate.

"Care must be taken to castrate all the males of the mixed breed before they are able to get young, and to put the females to full blooded rams. I repeat it, that without this care the improvement of the breed will be retarded.

"It is often asked, how many sheep may be supported on an acre of ground?—the question is not easy to answer. It will depend, of course, on the quantity and quality of the grass.

"It is difficult to determine accurately the proper quantity of food which should be given to a sheep; it would be necessary, in order to form any certain rule, to know how much it eats in the open fields. *Daubenton* supposes the quantity so eaten to

be *eight* pounds of grass, which according to him are reduced to two when dried. Let us suppose a Farm at fifty or sixty leagues to the south of Paris: in such a situation, at the season when there is no more pasture, a merino ewe that is with lamb or nursing may well be nourished within doors upon two pounds of hay, together with one pound of a mixture of grain and fine bran, or two pounds of roots.

"The age of sheep, during the first five years of their life, may be ascertained by means of their front teeth or incisors. The first year eight incisors appear, which are afterwards shed. The animal is born with these teeth, or if any of them are wanting they soon make their appearance; they are narrow and sharp. The second year the two front teeth fall and are succeeded by two new ones, broader than the six which remain. The third year the two next to the front teeth also fall out, two broad ones grow in their room; so that then there are four broad teeth and four not shed. The fourth year the two next likewise disappear, to make room for two broad ones. Finally, the fifth year the two corner teeth fall. Some judgment of the age may also be formed from the corner teeth, according as they are more or less entire. When the animal is young, the teeth are short; they appear long at an advanced age, because the teeth continue to grow and the gums shrink. Merinos keep their teeth longer than other breeds, although they shed them sooner."

SOME OF THE MORE COMMON DISEASES OF SHEEP, AND THEIR REMEDIES.

"*The Scab.* Every part of a sheep's body is liable to be attacked by this disease, which may be radically cured if attended to. It is more obstinate on the lips and nose than any where else, because the animal rubs those parts while eating. The cheapest and simplest remedy is, an ointment composed of three parts of grease to one of oil of turpentine.

"*The Rot.* This disease has been supposed incurable, when once confirmed. *M. L'Abbé des Pierres* has however assured me, that by means of branches of *Broom*, with which he filled the racks of his sheep houses morning and evening, in wet weather, during the winter, he has stopped a confirmed rot; that the mortality ceased, and that the sheep grew fat as soon as they were put upon this regimen: this remedy merits the utmost

attention. Broom possesses great qualities; it is aperitive; its oil is good for the *itch* or *scab*, &c. The rot is caused by rich and wet pastures.

"*Apoplexy.* This destructive disease does not attack a flock without giving notice, by symptoms which an attentive keeper may perceive. The sheep appear less and less lively; they do not play about; their eyes are not so bright as usual; their wool looks dull, and they eat with a kind of indifference. A careful Shepherd, when he perceives these symptoms, immediately bleeds the whole flock."

ON THE DIFFERENT QUALITIES OF WOOL, FROM DAUBENTON.

Question. What are the principal distinctions in the wool?

Answer. The wool is white or of a bad colour; short or long; fine or coarse; soft or harsh; strong or weak; nervous or weak.

Q. What are bad colours in wool?

A. White wool only will receive lively colours in dying; the yellow, red, brown, blackish, or black, are used only in coarse manufactures; but such wool as is fine is used for stuffs which retain the natural colour, and is not sent to the dyer.

Q. What difference is there in point of coarseness, in the filaments of wool?

A. There are very fine filaments in all kinds of wool, even in the coarsest; but however coarse or fine wool may be, the coarsest part will be at the ends of the locks; by examining a great number of specimens, different sorts of wool have been distinguished, which may be reduced to the five following, viz. Superfine wool, fine wool, middling wool, coarse wool, supercoarse wool.

Q. How can these different sorts of wool be known?

A. It is necessary to have samples of the different kinds of wool, to compare with that whose quality it is designed to ascertain. To make this examination, a lock of wool is to be taken from the withers of the sheep, where the finest wool of the fleece is always to be found; then separate a little the filaments from one or another, at the end of the locks, in order to see them better, and place them on the side of the samples upon black stuff, to make them appear clearer, when it will easily be seen which samples they most resemble.

Q. How is soft wool known from harsh?

A. It is sufficient to draw it between the fingers and lightly rub its filaments, to determine whether it is soft and mellow or harsh and dry.

Q. How is it known whether the wool be elastic?

A. Take a quantity of wool and squeeze it; if, on opening the hand it swells as much as it did before compressing it, it is elastic.

Q. What are the good or bad qualities of wool?

A. That wool which is white, fine, soft, strong, and elastic, is the best; that which has a bad colour and is coarse, harsh, and weak, is of an inferior quality; but that which is mixed with a great quantity of hair, (jarre) is the worst.

Q. What is this hair or jarre?

A. It is a fur or hair mixed with the wool, which is very different from it; it is stiff and shining; it has not the softness of wool, and does not take the dye when manufactured. Some of this *jarre* may be seen in superfine wool, and it is sometimes found as fine as the wool itself.

INTELLIGENCE.

Some opulent planters in Georgia are turning their attention to the cultivation of the Sugar Cane. From experiments already made, it is ascertained, that one acre of Cane will yield Sugar to the value of 2,400 dollars, deducting the expense of cultivation, which is about 400 dollars.

There was a great sale of Merino sheep at the Government establishment of Rambouillet, in France, June 16th 1813. Sixty-eight rams sold at an average price of 464 francs, 48 centimes, ($ 92 88.) None sold for less than 219 francs, 76 centimes, ($ 44.) The highest price given was 932 francs, ($ 187).

A new and valuable work on Chemical Agriculture, by the celebrated Sir Humphrey Davy, has lately appeared in Great-Britain. It is said to possess considerable merit, and promises to form an epoch in agriculture, both in Great-Britain and this country. It will probably soon be published here, and, if found to be as valuable as those who have seen it seem to believe, it will receive the patronage of the Massachusetts Agricultural Society, and, it is hoped, of all the friends to agricultural improvement.

NOTICE.

Official intelligence has been received by the Trustees, of the recent organization of Agricultural Societies in the several towns of Milton, Braintree, Quincy, Hingham, Dedham, Danvers, Holden, Shrewsbury, Ware, Lancaster, Southampton, Belchertown, Pelham, Vassalborough, and East Andover. Communications for the succeeding numbers of this publication from the above Societies, and from others which are or may be formed, as well as from individuals interested in the diffusion of agricultural knowledge, are earnestly solicited.

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CHOSEN JUNE, 1813.

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